Rock Products

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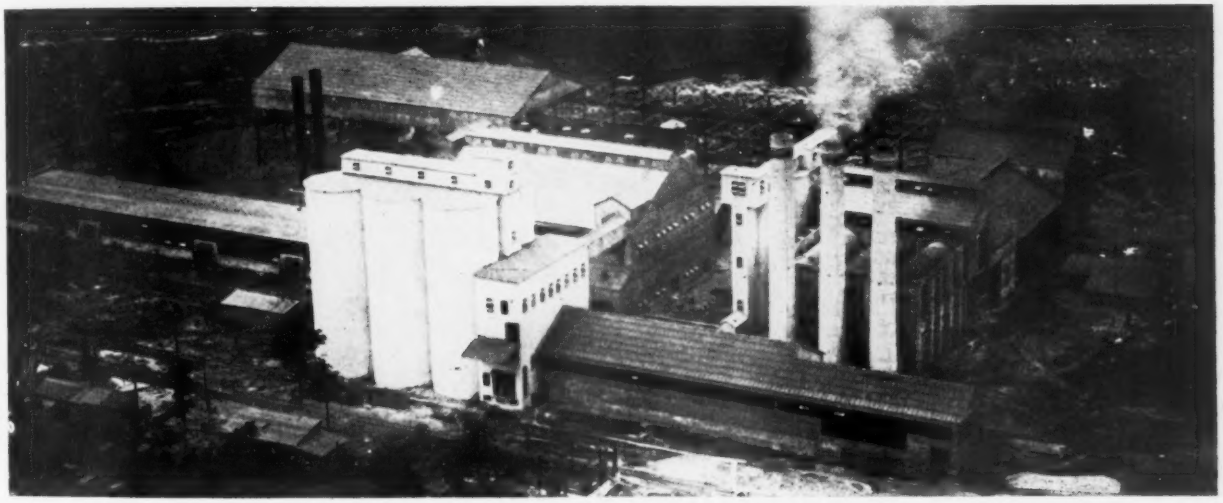
Phoenix Company's Birmingham Plant Completed in Record Time

This New 1,500,000-Barrel Dry-Process Plant Completed in Seven Months—Proximity to Fuel and Raw Materials, Cheap Power, Small Amount of Labor Required and Low Machinery Maintenance Costs Will Make Possible an Unusually Low Production Cost

ON September 25, 1922, the Phoenix Portland Cement Co., of Philadelphia, broke ground in North Birmingham, Ala., for the erection of its No. 2 plant. On April 28, this year, the plant produced clinker; exactly seven months and three days were required to bring the plant to this point of completion. On June 1, cement was loaded into box cars and shipped from the plant. Eight months and six days was the time consumed in *completely* building a cement manufacturing plant having a capacity of 1,500,000 bbl. per year! To the knowledge of Rock Products this is the first plant ever built in less than 10 months.



Aeroplane view of Phoenix plant at Birmingham 30 days before completion. Only a portion of the coal plant at the extreme right is shown

Cement plants are built as near the source of supply of the raw materials as possible. By raw materials are meant limestone, clay or shale. The matter of fuel, power and labor supply is usually given secondary consideration, for these essentials can be furnished irrespective of a plant's location. But plants with only the advantage of having their raw materials close at hand sometimes suffer a heavy expense in the transmission of power and the transportation of fuel.

The Phoenix company, in addition to stone and shale, has also available a nearby source of coal supply and power. Coal mines on land adjoining the company's property are connected by railroad with the plant, so that by using its own carrying equipment the company receives coal at the plant at the f.o.b. mines price; power is obtained from the Sloss-Sheffield Steel and Iron Co.'s byproduct plant nearby, at a cost considerably less than that charged by the local power company. This is possible through the fact that it is generated in a plant fitted with waste-heat-boiler equipment. It is easy to realize that by having these four essentials—stone, shale, fuel and power—so near at hand, an unusually low production cost will be attained.

Naturally, one of the first questions put to Mr. Morton, president of the Phoenix company, by the Rock Products editor who visited the plant was, "Why did you build a dry-process plant in face of the fact that on property adjoining you, and not two miles away, the Lehigh company is building a wet plant and nearly all, if not all, recent plants are wet process? Doesn't it cause you to believe that one of you is making a mistake?" And to this query Mr. Morton replied that both companies were justified in their selections because of the nature of the raw materials available for each plant. The shale owned by the Phoenix company, according to Mr. Morton, is of an excellent quality, unusually uniform, containing little moisture, while the clay owned by the Le-

General view of entire plant. Buildings from right to left are as follows: Crushing plant, storage, kiln building, coal plant, and at the extreme left, the truck-loading house. The stacks are 103 ft. high

high company is of a different deposit, locally called gumbo clay, containing a high percentage of moisture, and does not run uniform enough to permit the economical manufacture of a cement by the dry process that will pass present rigid specifications.

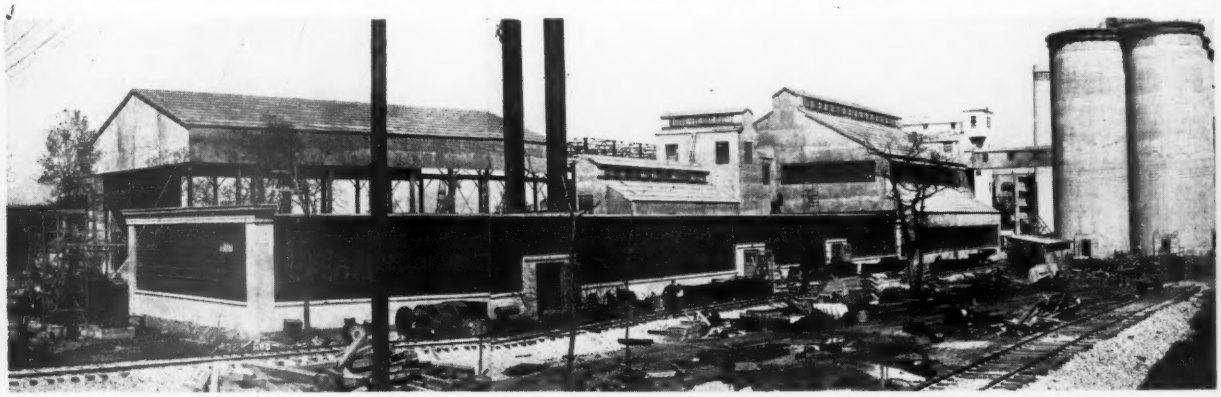
According to perhaps one of the best informed authorities on cement mill operation in this country—Richard K. Meade—it is a distinct economic disadvantage to use the wet process in manufacturing cement unless there is some special reason for its use. And according to this same authority, there is perhaps but one reason why it should be employed. That is when the raw materials are so lacking in uniformity that it is impossible to consistently control the dry mix.

While it is conceded by all authorities that the wet process affords a more positive manner of mix-control, it is generally admitted that the cost per barrel of the finished product by the dry process is considerably less than that by the wet process.

This fact remains regardless of the fact that grinding costs may be lower in manufacturing by the wet process; also, that drying equipment is eliminated, thereby saving fuel, power, maintenance costs and depreciation. There is but one primary reason why cement can be manufactured cheaper by the dry process than by the wet process and that is because *less coal is required for burning*. This is true because kilns are necessarily longer and the drying—done in the dry process by driers—is transferred to the kilns in the wet process, thus reducing their capacity.

In tests conducted by Richard K. Meade some interesting data were obtained having to do with kiln coal consumption in both wet and dry-process plants. The average of eight dry-process plants' heat requirements was 1,219,000 B.t.u.'s (per barrel), while the average of six wet-process plants' requirements was 1,696,317—a difference of 477,317 B.t.u.'s, or 34 lb. of coal. Deducting an allowance of 3 lb. per barrel for drying, this leaves a difference of 31 lb. per barrel cheaper—in favor of the dry process.

The foregoing has been quoted for the purpose of probably explaining why the



This view was obtained from the rear of the plant. The low building in the foreground contains the machine and blacksmith shops, change rooms, compressors and switchboards. Finish silos at right

Quarry view, taken from foot of incline. It is opened to a depth of 22 ft., averaging 60 ft. in width and is about 800 ft. long

These machines, together with a battery of jack-hammers, are responsible for all the drilling. The well drills are electrically powered

There are two of these electric crawler-tread shovels in the quarry

This gasoline-powered crane is used for general utility purposes about the plant

Phoenix company chose the dry method for its new plant and to make clear that it was to the company's economic advantage to do so since the nature of the raw materials permitted; also, to point out why the Lehigh company believes that a wet-process plant is necessary to make cement that will come up to specifications from the raw materials available on its property.

Quarry Opening

The Phoenix company is opening its quarry to within the neighborhood of 150 to 200 ft., it will be operated only to a depth of 20 to 22 ft. Later, the floor will gradually be lowered, working 15 ft. at a time. The deposit has no overburden and has been tested and found to be of suitable analysis to a depth of 200 ft. No tests have been made of the stone deeper than 200 ft.

Two electrically powered Cyclone well drills are responsible for the drilling, while Jackhamers are used for the boulders that are too large for the shovels. Stone is loaded to six cars at a time.

The loads are pulled up the incline one at a time by a large single-drum Flory hoist powered by a 100-hp. motor. The hoist is set up on the ground level under the upper end of the incline, its 1-in. cable passing over a 60-in. sheave on the crusher hopper floor. The cars are side-dumped direct into the crusher by a small single-drum hoist powered by a 15-hp. motor. The cable from this hoist passes through a sheave suspended from a girder above the crusher.

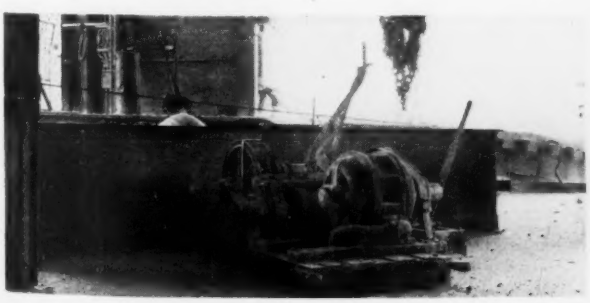
Most of the quarry hauling is done with the 8-ton storage-battery locomotive at the left; the steam locomotive is used for general purposes. The cars are of all-steel construction and have a capacity of 10 tons

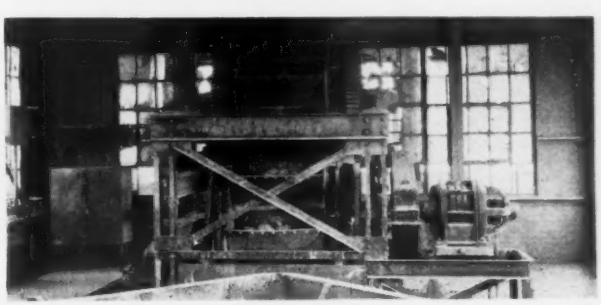
in an odd manner, but one which will in the final summary be the most efficient. All of the property is flat so that a pit operation is essential. In opening it, the method was to excavate a pit of crescent, or practically semi-circular, shape, one end of which is located at the crushing plant. At the present time the pit has been opened to a length of approximately 800 ft., having an average width of 60 ft. Until the quarry is lengthened several hundred feet more and widened into 42-in. gage, 10-ton Easton, V-shaped, all-steel dump cars by two Model 37 Marion shovels. These are of the full-revolving type, caterpillar tread and are electrically powered.

The loaded cars are pulled in the quarry to the foot of the incline leading from one end of the quarry to the crushing plant, by an 8-ton General Electric storage battery locomotive and a 15-ton Davenport steam locomotive. Each locomotive handles four

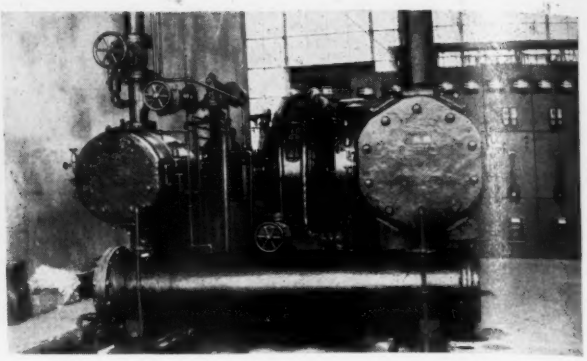
The primary crusher is a 30-in. Superior gyratory, driven by a 150-hp. motor. This machine discharges at 4 in. and its product is received by a 42-in. continuous chain-bucket elevator of 32-ft. centers. This elevator, as well as all other elevators and conveyors throughout the plant, was furnished by the Link-Belt Co. It is driven by a 25-hp. motor through a silent-chain drive.

The 4-in. and smaller stone empties from





The view at the left shows the steel guard around the hopper of the primary crusher; also, the small hoist used for dumping cars. At the right is the 42-in. elevator which takes the product of the crusher to the hammer crusher



The hammer crusher at the left discharges directly into storage; at the right, interior of the compressor room, showing one of the two machines and part of the switchboard

the elevator into a Model AJAX-8 Pennsylvania hammer mill driven by a 200-hp. motor and set to discharge at 1½ in. From it the stone is discharged directly into storage.

It might be said that in designing the plant the storage was first laid out and the rest of the plant built "around" it—that is, the storage is so located that it serves directly all the units dependent upon it. For instance, the stone is put into it directly from the crusher; the clinker is put into it directly from the kilns by means of a short drag conveyor; shale is dumped directly into it from the cars which haul it from the pits; only short conveyors for the stone and shale and clinker are required to move them to the grinding plant.

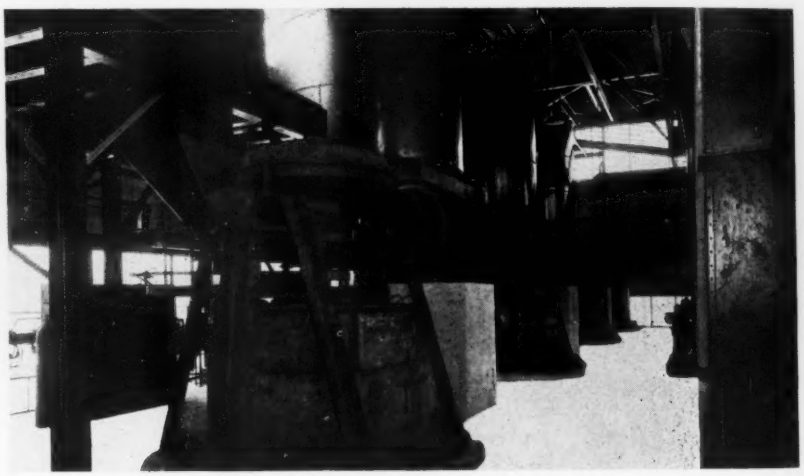
The storage is 82 ft. wide and 390 ft. long. Two 8-ton Champion cranes fitted with 3-yd. Blaw-Knox clamshell buckets travel the full length of it. Within the storage are separate bins and compartments for the various materials. The stone is stored in the greater part of one-half of it, while clinker occupies the greater part of the other half. In the center are three 1000-ton capacity bins which are kept filled with shale by the cranes. A double bin, each compartment measuring 15x15x15 ft., is used for storing shale and stone on the side of the storage closest to the grinding plant. From these the materials are fed to Schaffer poidometers, a 36-in. belt serving the stone and a 20-in. belt the shale. The mix, of course, varies according to the analysis of the materials, but the average mix is 1 part shale to 5½ parts stone.

Both of these belts empty on a 24-in. pan conveyor of 88-ft. centers leading to two 7x70-ft. Vulcan driers. These are mounted in a separate building and are fitted with specially constructed dust-settling chambers 16x30x20 ft. high, lined with firebrick. The driers are fired by pulverized coal pumped through a 5-in. pipe line from the coal pulverizing plant.

The driers discharge on an 18-in. open carrier which in turn discharges into an enclosed bucket elevator and thence into a second drag conveyor which passes over four 150-ton steel tanks, each one of which serves a unit of the grinding plant.

One Grinding Plant Only

There is but one grinding plant in the entire operation, exclusive of the coal pulverizing department. This is a radical departure from the usual cement-plant design embodying a "raw" grinding and a "finish" grinding department, each having its own set of grinding equipment. The Phoenix plant has four pulverizing units, any one of which may be used for pulverizing either shale and stone or clinker. Each unit con-

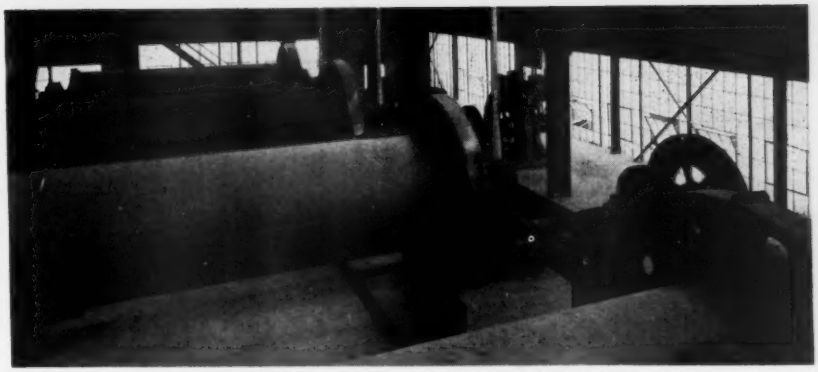


The four grinding mills. They are individually driven by 300-hp. slip-ring motors

This pan conveyor leads from the shale and stone bins in the storage to the grinding plant. Each product is fed to it by a poidometer

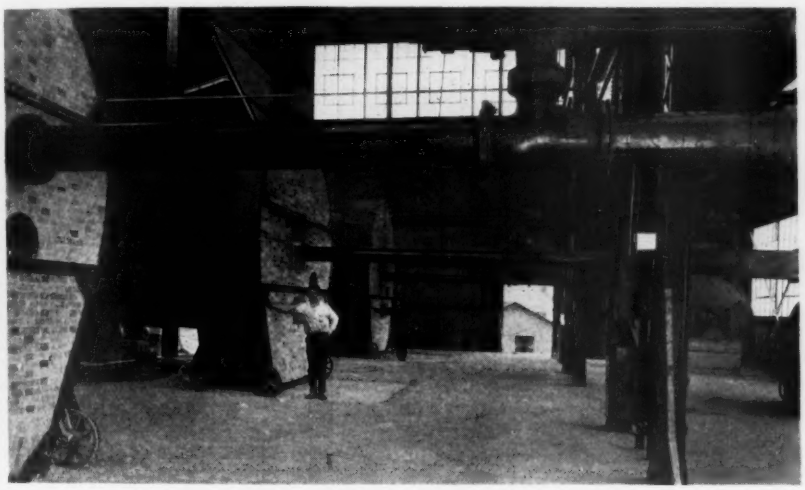
This one leads from the clinker bin in the storage to a set of 16x24-in. rolls. It is equipped with a weightometer which records the amount of clinker passing over it

sists of a gear-driven Bradley Hercules mill and a 7x26-ft. Traylor tube mill. As the material is discharged from the pulverizer —which is driven by a 300-hp. slip-ring motor direct-connected with flexible couplings —it is received in an enclosed bucket elevator which empties into a steel bin of 50 tons capacity mounted above the tube mill, thus affording a gravity feed. Each of the four mills is driven by a 500-hp. General Electric synchronous motor through a 60-in. Cutler-Hammer magnetic clutch. It is interesting to note that there are 84 motors in the plant, ranging from 5 to 500 hp., totaling 4400 hp., all of the same manufacture.



There are four of these 7x26-ft. tube mills, each driven by a 500-hp. synchronous motor through a 60-in. magnetic clutch

Mixed shale and stone or clinker can be directed to any one of the four tanks above the pulverizers. As these machines discharge, their product can be directed to any one of the tube mills. No. 1 pulverizer can have its product sent to No. 4 tube mill, and vice versa; then, also, the discharge of any of the tube mills can be directed to either of two conveyors, one leading to the raw material storage tanks and the other to the finish silos. This unique arrangement gives the utmost flexibility to the grinding operation and also reduces operating labor to a minimum. The company is well pleased with this and pronounce it a real success.



The firing ends of the three 10x150-ft. kilns. Each kiln is coaled from a 35-ton capacity steel tank

There are five silos for the accommodation of the raw material, each 17 ft. in diameter by 64 ft. high, having a capacity of 1600 bbl. They are of reinforced concrete construction and were built by the MacDonald Engineering Co., Chicago. The storage house walls, as well as all buildings about the plant, were also built by the MacDonald company and have a gunite surface applied by the Cement Gun Construction Co., Chicago. It is interesting to note that in designing the plant the use of concrete was specified wherever it was possible to use it; that the Phoenix company, in other words, applied the industry's own slogan, "Concrete for Permanence." The whole plant is of concrete, steel and glass construction, including the roofs, which are of concrete tile, furnished by the American Cement Tile Co., Birmingham. The plant, therefore, is absolutely fireproof.

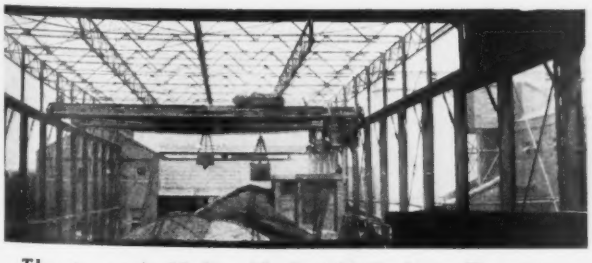
Handling Raw Materials

Removal of the raw material from the silos is effected by a network of screw conveyors so installed that blending of the materials from the different tanks is possible. The bottom of each silo is equipped with a rotary feeder of variable speed so that the exact desired amount from any silo can be drawn and conveyed to a main conveyor leading to any one of the small tanks directly serving the kilns. The amounts drawn from the silos, to be mixed in the main conveyors leading to the kilns, are, of course, determined by the chemical analysis of the contents of each silo.

Thus these raw-material silos serve the double purpose of storage bins and blending bins, where the raw mix can be finally corrected before going to the kiln bins the same as in a wet-process plant.

At the feed end of each kiln is provided a dust-settling chamber of reinforced concrete, lined with firebrick. They are 70 ft. long, 30 ft. wide and 45 ft. high and are fitted with baffle-walls with hopper bottoms. Screw conveyors underneath remove the dust and convey it back to the raw material silos.

The main conveyors from the silos empty into a steel tank at the head-end



The storage is 82 ft. wide by 390 ft. long. Two 8-ton electric traveling cranes equipped with 3-yd. buckets travel its full length

Coal is unloaded from the railway cars by this 15-ton locomotive crane into storage. It is also used for recovering from storage and loading the coal plant's supply bin

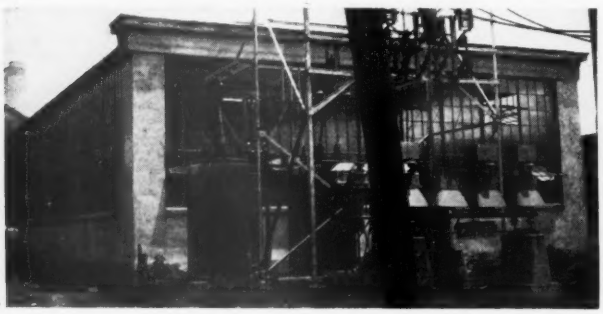
of each kiln. These have sufficient capacity to supply the kilns for about 8 hr. The material is fed from them to the kilns by screw conveyors. There are three 10x150-ft. Vulcan kilns, individually motored. They revolve at the rate of 30 times per hour and are equipped with recording instruments, set up in the office, which record the number of revolutions made by each kiln and have recording pyrometers which give the temperatures at the feed end of each kiln. At the firing end are three steel bins of 35 tons capacity for the storage of pulverized coal. The three stacks, 8 ft in diameter and 103 ft. high, also of concrete construction, were built by the Weber Chimney Co., Chicago.

Clinker falls from the kilns into a pit underneath in which operates a specially constructed drag-chain conveyor of unusually heavy design. This conveyor deposits its load in a pit in one corner of the open storage from which it is removed by one of the cranes and placed either in the storage proper or in a concrete bin at the side of the storage yard closest to the grinding plant. This bin is 18x18x20 ft. deep and it is here that gypsum is mixed with the clinker. A 24-in. pan conveyor takes the clinker from this bin to the grinding plant where it is put through a set of 16x24-in. Traylor rolls. The product of the rolls is then elevated and emptied in a trough extending over the bins serving the Hercules mills. The clinker is handled in this trough by drag conveyor. All clinker leaving the bin hopper at the storage yard is passed over a Merrick weightometer, thereby affording an accurate record of the number of barrels put to the grinding plant per day.

One of the company's cars. These are used for hauling coal and shale to the plant

ing of railway cars.

Adjoining the packing room is a bag house, 50 ft. wide by 175 ft. long. Here is installed the most modern equipment for the cleaning, sorting, repairing and storing of bags. End to end with this building is a building 50x300 ft. One end of this is a storeroom and change room, the latter being equipped with lockers, baths and sanitary fixtures; the center portion is a blacksmith and machine shop, and the opposite end contains the switchboards—from which all the machinery in the plant can be controlled—and the air compressors. Two Ingersoll-Rand compressors produce the air for the quarry equipment as well as that in and about the plant. Only one of these machines is used at a time, the other being ready for use in an emergency.



Showing part of the substation and the general repair-shops building

The office. It is practically square and is equipped with an unusually modern laboratory

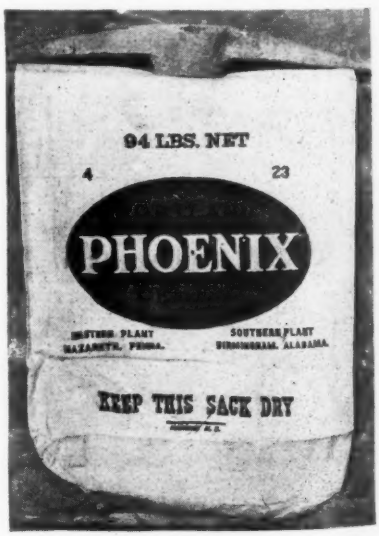
The stacks also are of reinforced concrete construction, stucco finish. They are 8 ft. in diameter and 103 ft. high

Finished Cement

The finished cement as it is discharged from the tube mills is moved by screw conveyor to six concrete silos 32 ft. in diameter by 85 ft. high, having, together with the two interspaces, a total capacity of 110,000 bbl. From this storage the cement is likewise removed by screw conveyor and elevated to steel bins over four 4-spout Bates packers. As bags are filled they are placed on 30-in. belt conveyors leading directly to railway cars. There are two conveyors, one extending from the packers to one side of the building and the other to the opposite side, so that two cars—one on each side—can be loaded simultaneously. There are siding accommodations for 60 loaded and 60 empty cars. In addition to the packing house there is a 20x60-ft. building used for loading trucks. This department is equipped with its own bagging machines so that the local trade is accommodated without interfering with the regular load-

Pulverized Coal Plant

The coal drying and pulverizing equipment is housed in a building 30x94 ft. adjoining the kiln building. Coal is unloaded from the company's own cars into an open storage by an 18-ton Orton & Steinbrenner locomotive crane. This machine also is used for recovering the coal from storage and placing it in a hopper bin on the outside of the coal pulverizing plant. From



One of the new sacks

this bin the coal is conveyed by screw conveyor direct into a 48-in. by 40-ft. Fuller-Lehigh drier. An enclosed chain-bucket elevator takes the dried coal to three 42-in. gear-driven Fuller-Lehigh mills, each powered by a 75-hp. motor, direct connected through flexible couplings. From them the coal is conveyed to a Fuller-Kenyon pump which pumps it by air through a 5-in. line direct to the bins at the kilns, to those at the stone driers and to the bin serving the coal drier.

Another novel feature of the plant is the absence of belts, the only ones being on the main crusher drive and those in the packing room. All other drives are either direct-connected or are Link-Belt silent chain drives, as in the case of all elevating and conveying machinery, as well as the kilns and driers.

Construction of some of the last buildings to be erected was considerably speeded by having the crushing equipment in operation in time to furnish stone. As the stone was crushed and discharged into the general storage it was removed by a 12-ton Orton and Steinbrenner gasoline crane fitted with crawler tread and ¾-yd. clamshell bucket and because of its flexibility is now used about the plant for general utility purposes.

In all, the company owns about 3 miles of standard railway siding. The plant is directly served by the Louisville & Nashville, the Mary Lee railway and the Belt railroads, thereby giving the equivalent of eight railway outlets. The plant is within a reasonably short distance from a concrete road so that the use of motor trucks in taking care of the Birmingham district can be afforded.

In laying out the plant ample room has been allowed for the addition of two more kilns and the necessary grinding units whenever the market conditions warrant it.

According to President Morton, the new plant has other advantages in addition to those mentioned having to do with the availability of natural resources and power. One of these is afforded through the plant's design; in that because it is built "around" its storage and because it has but one grinding department, the cost of production will be considerably lower than that of a similar plant not built around its storage and having two distinct grinding departments. The compactness of the whole plant makes possible a big saving in labor and some power as well. Another advantage he claims is made possible through the original selection of machinery. The experiences of the organization with equipment at its No. 1 plant at Nazareth, Pa., guided it in selecting equipment best adapted to the particular kind of plant in which it was to be used, with a view to low maintenance costs.

From this plant the Phoenix company will serve all of the territory in the South between the Atlantic coast and the Mississippi river. From its two plants the company now has its sales forces covering 22 states.

Mr. Morton is now making his home in Birmingham instead of Philadelphia. Besides the plant office, the company has executive and sales offices in Birmingham covering almost the entire 23d floor of the Jefferson County Bank building. R. J. Hawn is superintendent and had charge of the construction as well as the operation. S. C. McCurdy is sales manager of the Birmingham plant. The Phoenix company also operates a modern 1,000,000-bbl. cement plant at Nazareth, Pa. The other officers of the company are J. W. Walker, vice-president; A. W. Nash, treasurer; E. P. Haubert, secretary and purchasing agent; Charles H. Cox, sales manager of Nazareth plant; H. H. Leh, superintendent, Nazareth plant.

Wanted! Information About Sand and Gravel

THE American Concrete Institute is at present studying the fire resistance of concrete block, the writer being Chairman of Committee P-5 which is making these studies.

One line on which some study has been made is the fire resistance of concrete block made of various kinds of gravel aggregates. In the tests so far run we have found that tests on so-called "calcareous" gravel from Elgin, Ill., have shown a very high degree of fire resistance, while tests on so-called "siliceous" gravel from Meramec river performed very badly. We find, however, on chemical analysis that the Elgin gravel contains from 30 to 40 per cent of siliceous material SiO_2 while the Meramec ranks with Cowbay, N. Y., gravel as having the most silica in the country—93 per cent being found.

The point naturally arises that if calcareous gravel having 40 per cent silica resists fire well, at what point does the silica content seriously impair the fire resistance of concrete? We have analyses of seven or eight different gravels containing 50 to 70 per cent silica, and in view of the growing practice of engineers of avoiding the use of so-called siliceous gravel in concrete that may be exposed to fire, and of the sweeping condemnation of it by fire insurance engineers, it becomes of great importance to the sand and gravel industry and to concrete users who use such large quantities of gravel to find out at what point the siliceous content of gravel concrete impairs its fire resistance.

The study of this problem is much too big a one for Committee P-5 of the American Concrete Institute. Do you know of any tests or researches which would help our committee in their study of this matter as it affects their work?

Have you any information regarding the chemical content of other gravels such as Niagara river, New England bank gravels or Ohio river gravel? Can you tell us what constitutes a normal siliceous gravel or a normal calcareous gravel?—Leslie H. Allen, Portland Cement Association, Chicago, Ill., chairman, Committee P-5, American Concrete Institute.

New Mineral Fertilizer

A NEW and unique method of increasing crop yields comes from Japan. It consists of a product called "promoloid," based upon colloidal silicate of magnesium, says an article in the *American Fertilizer*. The makers state that "it is not a manure, but an agent which accelerates the growth of vegetables, improves their taste, color and form, and enables an unusually fine crop to be realized."

The following explanation of the origin of the material is given by the manufacturers. Some districts in Japan are noted for the early production of vegetables of the best quality, such yield being limited to certain tracts of land. The crop in neighboring soil, under similar conditions of planting and cultivation, is distinctly inferior. These limited areas of specially productive soil are found in widely separated parts of the islands. A careful analysis of the soil from each of these districts disclosed the fact that colloidal silicate of magnesium was common to all of them. It seemed likely that this element contributed to the exceptional yields from these soils.

After some research, the manufacturers claim to have succeeded in making a chemical composition of colloidal silicate of magnesium. They state that their product has been subjected to field tests by disinterested farmers, and has proved to have distinct value in increasing the yield and quality of crops. They have now invited the agricultural colleges to make an official test of the material. "Promoloid" is sold in a liquid form, and is to be diluted with water before being applied to the soil.

Nothing is known of this material in this country, except the statement of the manufacturers. Nor does it follow that the same results could be obtained from its use in this country as in Japan. The land in that country is of volcanic origin, and probably contains substances not found in the soils of the United States. But the story of the discovery of the product is interesting, and the research it involved is creditable to the Japanese.

Potash in 1922

THE Interior Department announces that returns received by the Geological Survey, from the producers of potash in the United States indicate that the output in 1922 amounted to 25,176 short tons of crude potash salts containing 11,714 short tons of actual potash (K_2O). The sales amounted to 22,028 short tons of crude potash containing 11,313 tons of (K_2O) valued at $463,512. About 30,000 short tons of crude potash were held by the producers December 31, 1922.

Plaster of Paris*

I—The Chemistry of Gypsum

By A. Brittain, M.Sc., A.I.C., and C. Elliott, B.Sc.

GYPSUM can exist in two crystalline forms: (1) Monosymmetric (gypsum); (2) orthorhombic or labile form. When heated a period of induction first occurs, during which the monosymmetric crystals of gypsum are converted into an orthorhombic form without loss of water (Davis, J., 1907, 733).

Calcium sulphate also exists in combination with water as the hemihydrate, $CaSO_4$, $\frac{1}{2}H_2O$ (orthorhombic), which sets rapidly with water.

In the anhydrous forms three varieties of calcium sulphate are recognized: (1) Soluble anhydrite (orthorhombic) which is extremely hygroscopic and sets rapidly with water; (2) slow-setting anhydrite (orthohombie) which is not hygroscopic, but which takes up water and sets slowly; (3) natural anhydrite (orthorhombic) which is usually regarded as non-setting, although Keane (J. Phys. Chem. 1916, 20, 701) found that this form sets slowly with water when sufficiently finely ground.

When gypsum is calcined any of the above-mentioned varieties can be obtained, according to the temperature of calcination.

Although the dehydration of gypsum has been the subject of many researches since Lavoisier published the first paper on the problem in 1765 (Comptes rend., Feb. 27, 1765, and March 16, 1766) surprising differences of opinion are recorded as to the temperature at which dehydration occurs, and the nature of the products formed. It was not until 1907 that the transition points of the system gypsum-hemihydrate and hemihydrate-soluble anhydrite were definitely established. In that year Davis (J., 1907, 727) stated quite definitely, in contradiction to previous workers, that: (1) Gypsum when heated in an open vessel at 98 deg. C. lost water with the formation of hemihydrate. (2) The hemihydrate only changed into soluble anhydrate at 107 deg. C., or above. (3) Soluble anhydrite, by absorption of moisture from the air, rehydrated to form the hemihydrate. The conclusions drawn from these observations: (1) that the half hydrate was formed as the intermediate product in the dehydration of gypsum; (2) that the transition point of the system, gypsum-hemihydrate, is 98 deg. C., and of the system hemihydrate-soluble anhydrite is 107 deg. C., were important, since the existence of the hemihydrate, which is the main constituent of all commercial plasters, had been previously questioned by Cloez (Bull. Soc. Chim., 1903 (iii.), 29, 169 and 171).

Although the work of Davis definitely fixed the theoretical transition points of the two systems, it was observed that in actual technical dehydration of gypsum, these two transition temperatures did not hold, and that temperatures far exceeding these were actually employed.

Theoretically, gypsum should be converted into hemihydrate at 98 deg. C., but owing to the fact that it only develops its vapor pressure very slowly, and that the rate at which this pressure is developed decreases with increase in the size of particle (Precht and Kraut, Annalen, 1875, 178, 38) it is both possible and necessary to heat the material above its transition point in order to effect the dehydration in a reasonable time These observations hold, of course, for the secondary change of the hemihydrate to soluble anhydrite. This super-heating has led to some considerable confusion in the literature as to the temperatures at which these changes occur in technical practice.

L. A. Keane (J. Phys. Chem., 1916, 20, 704) has reviewed this aspect of the subject, and after pointing out the discrepancies which appear in the work of previous authors draws a number of conclusions which appeared to us to be of too general a nature. It seemed to us that there might be a range of temperatures, over which the loss of water from gypsum might take place, giving either the hemihydrate or the anhydrous form, the exact temperature being dependent upon the conditions of heating and the fineness of the material.

We were thus led to conduct a series of experiments in order to elucidate this point, which have been described by us in a previous paper (Trans. Ceram. Soc., 1923).

The data obtained as a result of this work made clear in some measure the cause for the varying statements as to the temperatures at which gypsum is dehydrated commercially.

The conclusions we arrived at were briefly as follows:

(1) In the calcination of finely ground gypsum the production of the hemihydrate occurs within the approximate temperature limits, 109 and 130 deg. C., the actual temperature of the transformation depending on the rate of heating. Below the lower temperature limit the rate of loss of water is too slow to be a commercial proposition.

(2) The hemihydrate-soluble anhydrite change occurs within the approximate temperature zone of 160-200 deg. C., and again the actual temperature of conversion depends on the rate of heating.

(3) During these two changes the actual temperatures of conversion remain constant until the change itself is practically completed.

(4) The dehydration of lump gypsum by heating with hot gases proceeds slowly; the surface temperature of the lumps greatly exceeds the temperature at which the change gypsum-hemihydrate occurs. For this change there appears to be an inversion point in the neighborhood of 100 deg. C.

In the case of anhydrous calcium sulphate, again there is very considerable difference of opinion as to the effect of time of heating, and of temperature, and especially the very high temperatures at which flooring plasters and plaster cements are made. We will, therefore, confine ourselves to the anhydrous forms that are likely to be found during the commercial dehydration of gypsum for the production of plaster of paris.

It has already been observed that the hemihydrate changes to the anhydrous form at 107 deg. C. or above. Heated at this temperature, or slightly above, a completely anhydrous sulphate can be obtained which sets rapidly with water, and which is ex-

EDITOR'S NOTE

THIS is the first of a series of four articles, based on a paper read before the Society of Chemical Industry of Great Britain. It represents the latest and most complete exposition of the gypsum plaster industry in that country.

American readers, we are sure, will be glad of the opportunity to compare notes with British practice. Together with the series of articles recently published in Rock Products—"The Gypsum Industry from a Quality Man's Viewpoint"—these articles comprise the most important contributions to the literature of the industry in several years.—Editor.

*Read at a meeting of the Nottingham Section on Feb. 21, 1923.

tremely hygroscopic, absorbing moisture from the atmosphere and reverting to the hemihydrate.

Hursch (Trans. Amer. Ceram. Soc., 1915, 17, 549) states that when heated under technical conditions for some time above 200 deg. C., gypsum becomes completely dehydrated, but that the time for rehydration is very much increased, although heating for short periods at temperatures considerably in excess of this does not appreciably reduce the setting properties. When heated for long periods at 200-300 deg. C., or for short periods at higher temperatures, the product becomes "dead-burnt," and will rehydrate only very slowly but without setting.

Eckel, on the other hand, states that no anhydrous calcium sulphate is formed under technical conditions which are below 204 deg. C.

There is no doubt, however, that these statements require some modification. Experiments that we carried out show that when dehydrated under technical conditions, a finely ground material is converted into the anhydrous form at a temperature of about 200 deg. C. At 194 deg. C. a finely ground material lost the greater part of its water, but in order to remove the last 0.5 per cent of water a slightly higher temperature was needed. The material formed in this way was very hygroscopic and set rapidly with water.

There appears, however, to be a development of a form of anhydrous calcium sulphate at these temperatures which sets only slowly with water to a hard, coherent mass, but which does not reabsorb moisture from the air and revert to the hemihydrate. This form must be distinguished from "dead-burnt" calcium sulphate formed at somewhat higher temperatures which does not ordinarily rehydrate with water.

A Divergence of Opinion

There appears to be some divergence of opinion as to whether soluble anhydrite, slow-setting anhydrite, and "dead-burnt" or natural anhydrite are different modifications of anyhydrous calcium sulphate, or whether the difference in properties is due to the condition of the surface of the particle. We are inclined to agree with Keane (*loc. cit.*) who, after reviewing all the previous literature on the subject, concluded that there is only one anhydrous sulphate, that the question of setting or non-setting is primarily one of size of particle, the two important factors being temperature and time of calcination. Keane found that "dead-burnt" plaster formed at 600 deg. C. did not set if the average diameter of the particle was 0.05 mm., but that when ground so that the particles had an average diameter of 0.005 mm. it set rather rapidly to a hard resistant mass. From this result he concluded that natural anhydrite could be made to set if ground sufficiently fine, although the size of particle would have to be less than for the anhydrous form made from gypsum by burning.

Fine grinding has the effect of accelerating the setting of calcium sulphate, whether it be in the form of hemihydrate or soluble anhydrite, due to the increased mass action obtained by offering a greater surface to the action of water, solution of the calcium sulphate and subsequent deposition of the hemihydrate occurring at an accelerated rate. Slow-setting anhydrite which took some hours to set was thus accelerated by grinding, a material being obtained which set within an hour.

Inclination to Sinter, Shrink and Become Dense

By prolonged action of heat on soluble anhydrite at low temperature, say below 200 deg. C., or for a shorter time above this temperature, it is probable that the surface of the particle is inclined to sinter, shrink, and become more dense, and therefore a smaller and more resistant surface is offered to the action of water. The properties would then obviously depend on the degree of sintering and shrinkage of the particles and on the condition of their surfaces. Thus, a slightly sintered material formed at low temperatures would tend to set slowly with hardening, while a badly sintered and dense material would not set at all. If this be so, then by grinding the particles, and thus offering a large effective surface, the rate of solution would be increased, and consequently the rate of setting.

The actual temperatures and the rate of development of slow-setting and "dead-burnt" anhydrite will probably depend to some extent upon the quality of the raw gypsum employed. The presence of impurities, generally speaking, will have the effect of lowering the fusion-point of the material, and thus increasing the tendency to sinter. In the more impure materials, therefore, one would expect to find an increased tendency towards the production of slow-setting or "dead-burnt" anhydrite, although the nature of the impurity would have to be considered, all impurities not having the same effect in this direction.

(To be continued)

American Opportunity to Obtain Process for Concrete of Special Qualities

DR. CURT R. PLATZMANN, the leading authority in Germany on portland cement, writes the editor as follows:

"I have applied for a German patent covering a method of making a fire-resistant concrete, and the patent office has taken the initial step in granting such a patent. Naturally I am concerned in getting the processes patented and utilized in other countries as well. In view of the low value of the German mark it will be hardly possible for me alone to finance the application unless interested parties in these countries should carry the application fee and annual fees for the patent. I wish to ask you the very simple question whether you are in a position to put me in touch with an American company who might be willing to cooperate with me in this matter?

"As to the financial side, I would consider either a single larger outlay or annual remittances for license fees during the life of the patent.

"The special advantages of my process are briefly summarized for your information as follows:

"1. Greater strength of the concrete due to the greater density of hydraulic admixtures such as puzzalan trags, phonolith, introduced in powdered form as against the granular crushed stone.

"2. Increased elasticity of the concrete.

"3. Impossibility of checking or cracking.

"4. Great density of the concrete, especially in cases when the crushed stone is nearly free from the finest particles.

"5. Resistance of the concrete to chemically injurious gases of ignition.

"6. High fire resistance, at least 1100 deg. C., probably 1400 to 1500 deg.

"7. Low specific gravity, 1.72 instead of 2 to 2.4.

"8. Homogeneous and easily finished surfaces.

"9. Ease of handling the concrete as it can be mixed much wetter than ordinary concrete.

"10. Saving of cement since mixtures of 1 to 4 or 6 can be used instead of the 1:2 mixture now required in lining rotary cement kilns.

"I am of course ready to furnish all the necessary data to you or the interested parties; but would demand a signed agreement to keep this information confidential until a contract is concluded and to have due regard to my property rights in the invention. In return I would engage to contribute my best efforts and the benefit of my experience in this field during the continuance of the contract."

The editor of ROCK PRODUCTS will be glad to put interested parties in touch with Dr. Platzmann.

A Novel Sand and Gravel Plant

A Portable Dragline Cableway Excavator Digs Material for Coon River Sand Co. at New Van Meter (Iowa) Plant—Dewatering Bins and Unusual Method of Screening and Washing — No Elevators Except for Finished Products

A GRAVEL plant that is novel in practically every respect is the latest creation of R. Snoddy, manager of the Coon River Sand Co., of Des Moines, Iowa. Mr. Snoddy needs no second introduction to the sand and gravel industry, having always been noted for his original ideas of sand and gravel plant operation.

The plant during construction. Loading trucks go on either side of the main bins

The A-frame containing the hoist house, grizzly hopper and dewatering screens. The field belt conveyor goes under the A-frame

The new Coon River Sand Co.'s plant is located at Van Meter, Iowa, on the Coon river, where the company has 1½ miles frontage on the river. The deposit in the river analyzes more than 60 per cent gravel and goes to a depth of 38 ft. It is said to be the rim of a prehistoric lake preceding the Rocky Mountain Glacial period, and is unusually clean. Tests by the Iowa Highway Department have shown less than ¼ of 1 per cent shale and other soft stone in the deposit before going through the plant.

Excavating the Deposit

The river deposit, which has an average width of 250 ft., is worked by a dragline cableway excavator. The mast of the excavator is a heavy structural steel A-frame 24x36x46 ft., resting on rollers which move the frame to any desired spot along the deposit. The hoist, a Thomas two-drum, 75-hp. direct-connected to a 75-hp. electric motor, operates the dragline cableway excavator and is situated at one base of the frame, while the dumping hopper and primary scalping screen are at the other. The complete arrangement is shown by one one of the accompanying sketches.

At the opposite side of the river are the "dead men" for the cableway system. These are 50 ft. apart, although in actual operation the complete span is 100 ft., one "dead man" being straddled. In this manner 50 ft. of the deposit is taken at one stretch, the cable then attached to the next "dead man," 50 ft. more taken off, and so on. The Mansfield dragline excavator bucket has 1½-cu. yd. capacity, and has a speed of 300 ft. per minute traveling and 100 ft. per minute loading.

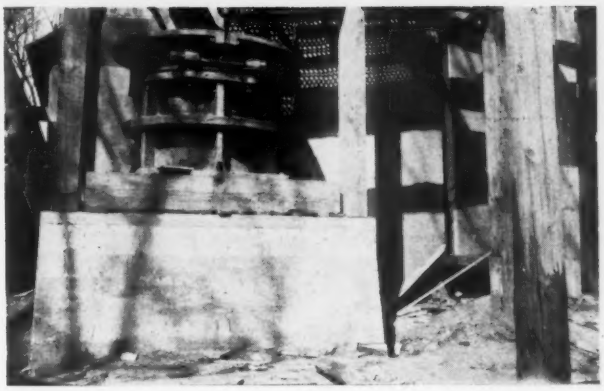
The bucket discharges its material to the hopper at the cable end of the A-frame. The top of this hopper is fitted with a grizzly set at an angle of 30 deg. and has steel rails, the flanges of which have been cut off. The rails are spaced 10 in. apart. Thus, all material over 10 in. is rejected while that passing through goes to a second grizzly immediately below the first and at an angle of 35 deg. to it.

The second grizzly has 2-in. openings, so that all material over 2 in. is chuted direct to the field belt conveyor underneath the A-frame. All material under 2 in. goes to a 38 in. by 8 ft. dewatering screen with 3/32-in. openings. The water is flumed back to the river while the gravel is chuted to the field belt conveyor and forms a cushion for the heavy material received from the second grizzly. A sand waste screen is also provided in case some portion of the deposit should have an excess of sand that is not desired.

Conveying and Screening

The field belt conveyor is 24 in. wide and is made up in 16-ft. sections so that it can be moved or extended as the dragline excavator is moved. It travels at a

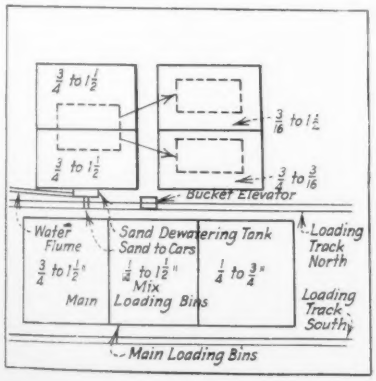
Coon river, from which the gravel will be dug. The deposit averages better than 60 per cent gravel



At the left, details of grizzly hopper on A-frame. To the right, the No. 5 gyratory crusher receives rejections from scalping screen, reducing to 1½ in. and under

speed of 190 ft. per minute and discharges to the plant belt conveyor, 24 in. wide, 56-ft. centers and set at right angles to the field conveyor. The plant conveyor has a 12-deg. inclination and discharges to a 38 in. by 8 ft. scalping screen with 1¾-in. holes. This screen has a speed of 12 r.p.m. The oversize is chuted direct to a No. 5 Telsmith gyratory crusher, which reduces to 1½ in. and under. The discharge from the crusher and the fines from the scalping screen are reclaimed by a bucket elevator which discharges to the first screen on top of the dewatering bins. This screen is 4 ft. 9 in. by 10 ft. and has ¾-in. perforations.

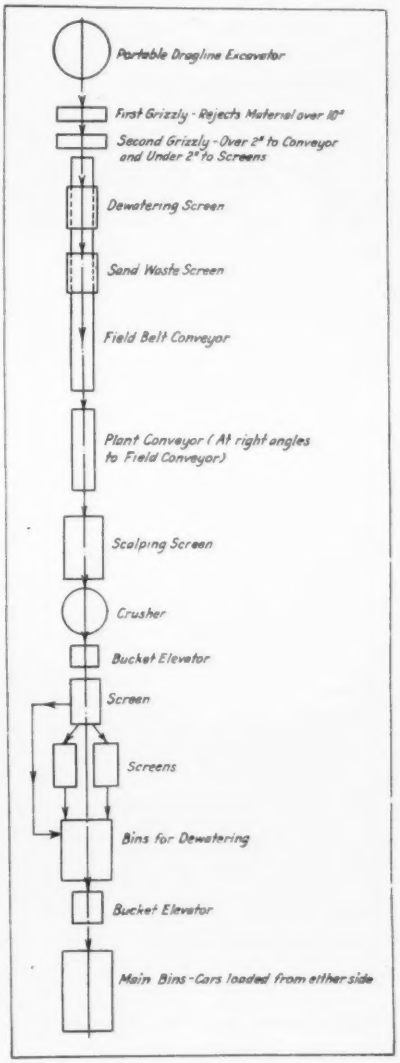
When the field conveyor discharges at right angles to the plant conveyor the material can be diverted to a grizzly bar screen, the rejections over 1 in. going to the plant conveyor to go through the plant in the usual way, while the fines, being the sand and the gravel under 1 in., by



Screens over the dewatering bins and sizes of gravel contained in bins

bucket elevator to a small set of overhead bins from which it is loaded to trucks as unwashed ballast of about 30 per cent small gravel for road-graveling purposes.

The next point of optional route of the material is at the head of the bucket elevator from the crusher and scalping screen. The material may be diverted from the plant screens and sent directly into cars as unwashed railroad ballast. At this point also a grizzly bar screen of 1 in. may be inserted so that the ballast going to the car will contain about 30 per cent gravel, with nothing over 1 in., the gravel

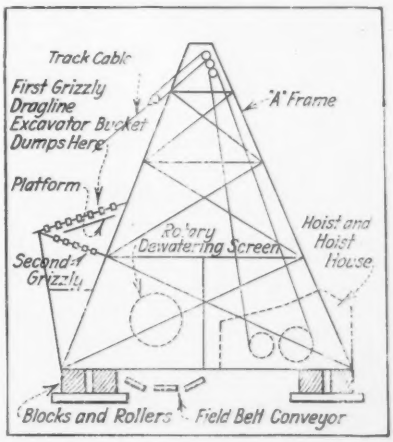


Flow sheet of material from excavating to loading

over 1 in. going the usual route through the sizing and washing screens into the plant.

A further diversion is made after passing the first screen, which has ¾-in. openings. The sand and gravel under ¾ in., together with the wash water, goes direct to cars through a separating tank where the water is removed before loading.

The fine material from the first screen is chuted to two 4-ft. 9-in. by 10-ft. screens fitted with 3/16-in. perforations. All material under 3/16-in. goes either direct to the cars for loading or is chuted to the flume leading to the waste pond. This plant is primarily designed for gravel, and reclamation of sand is a secondary consideration. As a matter of fact, it is the intention of the company to waste all the sand unless some demand for this product



Details of A-frame, grizzlies, dewatering screen, and field belt conveyor

should arise that could not be filled at the company's other plants.

Underneath the three screens are four dewatering bins which have a combined capacity of 200 tons. The purpose of these bins is to dewater the gravel so that it is dry when it gets to the main bins and at the same time forms a good storage. One of the accompanying sketches shows the

screen arrangement on the dewatering bins, sizes of gravel contained in the bins, and the sand disposal arrangement.

The material from the dewatering bins is drawn out from gates at the bottom and delivered to a bucket elevator of 68-ft. centers which discharges the product to the main loading bin. This bin is divided in three sections and contains material ¾ in. to 1½ in., ¼ to ¾ in. and in between is the mix bin containing material from ¼ to 1½ in. in size. A spout with a bull wheel and cable arrangement is provided for at the discharge of the bucket elevator, so that the product or any mix or size can be diverted to any one of the three sections. The spout is controlled from the bottom of the plant.

The main loading bin is 24x48x40 ft. Each section has two discharge spouts on each side, there being 12 in all as car loading will be done from either side. The bin has a total loading out capacity of 1300 tons.

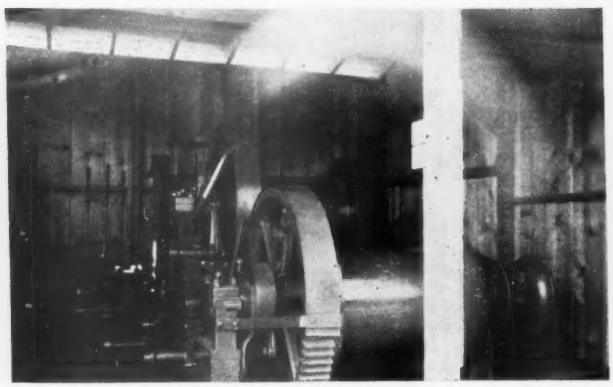
A small centrifugal pump with a capacity for 500 g.p.m. of clear well water is provided for washing purposes. Water is injected on each end of the screens on the dewatering bins, thus insuring a product free from impurities.

The plant is electrically operated throughout. Current is brought into three 50 kv.-a. transformers at 6600 volts and is stepped down to 440 volts at which voltage all motors operate. Each piece of equipment has an individual drive and every motor has its own starter. A total of 200 hp. is required to operate the entire plant, the classification being as follows: Hoist, 75 hp.; dewatering screen, 5 hp.; field conveyor, 10 hp.; crusher plant conveyor, and scalping screen, 60 hp.; water pump, 15 hp.; three screens and crusher elevator, 20 hp.; main elevator to loading bins, 15 hp.

All the motors are General Electric and operate at 1200 r.p.m. except the motor running the dewatering screen, which has a speed of 900 r.p.m. The plant has a capacity for 25 cars a day and can be operated at half capacity by three men.

The plant was built under the personal supervision of Mr. Snoddy who constructed it without the use of a drawing. He was assisted by William Gelatt, general superintendent.

Right, R. Snoddy, manager of Coon River Sand Co.; left, William Gelatt, general superintendent



Two-drum 75-hp. electric hoist for operating the dragline cableway excavator

Three 50-kv.-a. transformers receive current at 6600 volts and step down to 440 volts for operating

Barytes and Barium Products in 1922

THE sales of barytes mined in the United States in 1922 amounted to 155,000 short tons, more than twice as much as in 1921 and about 75 per cent of the average yearly sales for 1916 to 1920. The total value of the domestic barytes sold in 1922 was $1,123,950, an average of $7.25 a ton.

Barytes is a heavy white mineral that enters extensively into modern paint manufacture. An inferior grade of pigments is made from it by grinding it so fine that its powder can be floated on water. A better grade of pigment is made by chemical treatment, and a superior grade by making chemically a mixed zinc and barium pigment.

Missouri continued to lead in the production of barytes in 1922, but Georgia was a close second. More than three-fourths of the total domestic output for the year came from these two states.

The imports of crude barytes in 1922 amounted to 23,239 short tons, valued at $104,680 at the foreign ports of shipment. This is about twice as much as the imports in 1921 but a little less than those in 1920. The barium products industries in the United States consumed 167,842 short tons of ore during the year. From this ore they made 46,176 short tons of ground barytes, 83,360 tons of lithopone and 15,900 tons of barium chemicals, having a total value of $11,397,832. This is about one and one-half times the quantity of barium products manufactured and sold in 1921, but not so much as was made in 1920. The average annual value of lithopone has decreased from $139.69 a ton for 1920 and $121.45 for 1921 to $110.53 for 1922. Most of the lithopone produced in 1922 was made in Pennsylvania, Delaware and New Jersey, in the vicinity of Philadelphia, where there are eight operating lithopone plants or more than half the total number in the country.

Over 80 per cent of the ground barytes was produced in Missouri. Barium chemicals were made in eight plants, of which New Jersey, New York, Pennsylvania, West Virginia, Tennessee and California have one each and Illinois two. More than half the chemicals made consisted of barium sulphate (blanc fixe), but large quantities of carbonate and chloride were also made.

The imports of barium products, including ground witherite or natural barium carbonate, in 1922 amounted to 27,300 short tons, valued at $1,573,052. This is more than twice the quantity imported in 1921. More ground barytes was imported in 1922 than in any year since 1913, and over four and one-half times as much as was imported in 1921. The imports of lithopone in 1922 amounted to 21,525,824 lb., which is more than twice the quantity imported in 1921, and in fact more than the total quantity imported in six years.

Nature, Preparation and Use of Pulverized Coal*

VI—A Description of the Ruggles-Coles Drier —The Four Types of Pulverizers Employed

By Richard K. Meade
Chemical and Industrial Engineer, Baltimore, Md.

THE Ruggles-Coles (Class A) drier consists (see Figs. 10 and 11) of two concentric cylinders which are fastened together and revolve on steel tires supported on bearing wheels. The cylinder is revolved by means of a girt gear meshing with a pinion and with other gear reductions. The inner cylinder extends beyond the outer one at the head end; this cylinder is connected with a brick furnace by a flue lined with firebrick.

The coal is fed into the head end of the drier between the two cylinders and is caught up by flights on the inside of the larger shell and dropped on the hot inner shell.

As the machine continues to revolve, the coal in turn drops from the inner shell to the bottom of the larger one, is carried up by flights and again dropped on the hot inner shell, etc., and gradually works its way through the cylinder due to the inclination of the latter.

The hot products of combustion pass from the furnace down through the inner cylinder and then back between the shells. Draft is induced through the cylinders by means of an exhaust fan. The drying is effected by means of the hot inner shell and the current of hot gases to which the material is subjected. Fully dried coal is discharged through the center of the rear end by means of a special arrangement of lifting plates, or through a stationary bottom discharge head, as desired.

This drier is made in a number of sizes, details of which are indicated in Table VIII.

Both the Fuller-Lehigh and the Ruggles-Coles driers are what are known as *indirect fired driers*—that is, the gases from the furnace do not come directly in contact with the material to be dried but are first allowed to cool somewhat, so that when they come in contact with the coal being dried, there is no danger of the latter being ignited or even suffering the loss of any of its volatile content.

By so placing the combustion chamber that there is no possibility of any flame coming in actual contact with the coal being dried, it is possible to use direct-fired driers for drying coal, and many of these are now so used. In order to accomplish this result, it is only necessary to set the grate at a sufficient distance from the end of the cylinder to have the combustion complete and the resulting gaseous products cooled below the point at which the coal ignites. This is accomplished by placing a brick chamber between the firebox and the cylinder in which openings are placed between the grate and the end of the cylinder so that atmospheric air can be mixed with the products of combustion and so further cool these.

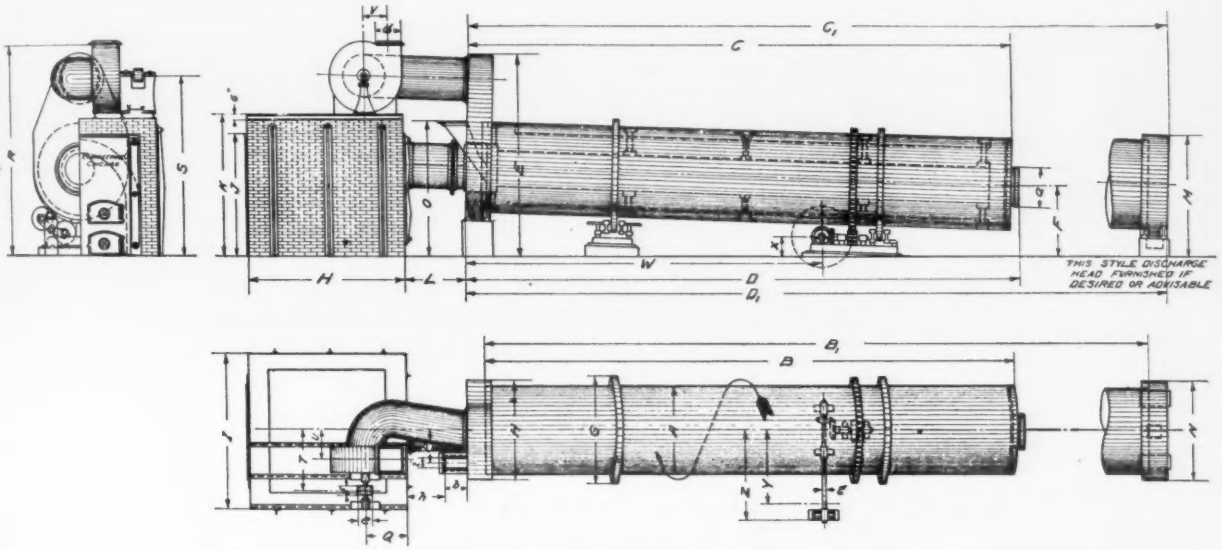


Fig. 10—The Ruggles-Coles drier

TABLE VIII. SIZE, CAPACITY, ETC., RUGGLES-COLES DRIERS

No.	Diameter outer cylinder, in.	Length outer cylinder, ft.	Capacity*—tons per hr.	Power to operate—hp.
A-1	36	16	2	6
A-2	48	20	4	10
A-4	54	26	5½	12
A-8	60	30	8½	16
A-10	70	35	13½	20
A-12	80	45	18½	33
A-14	90	55	24	45

*When drying Eastern bituminous coal having 8 per cent extraneous moisture dried to 1 per cent moisture.

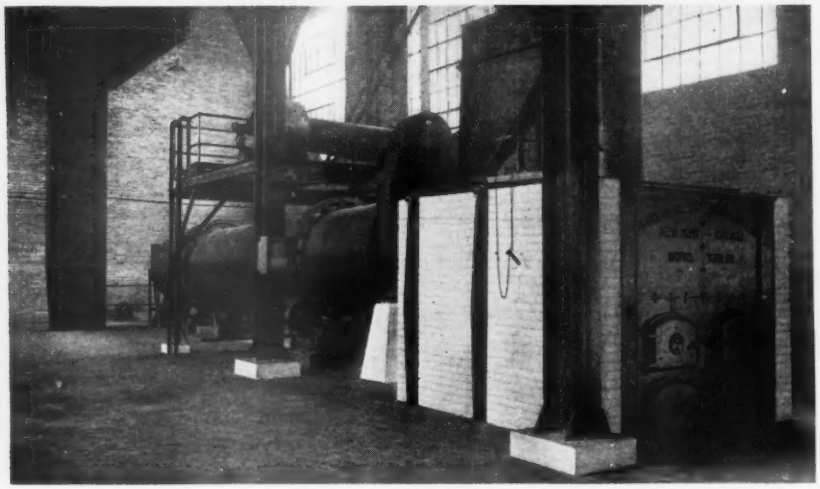


Fig. 11—View of Ruggles-Coles drier in the plant of Follansbee Brothers Co., Follansbee, W. Va.

It is desirable in the case of these driers to install a pyrometer where the gases enter the cylinder in order that the temperature may be controlled. This pyrometer should be attached to an automatic governor by means of which air is added to the furnace gases to cool these as needed. While the entrance of the air cools the combustion gases, it does not necessarily detract from the efficiency of the drier because hot air itself is an excellent medium for drying.

Every one is familiar with the rapidity with which a substance may be dried if it is placed in a current of warm air. This is due to the capacity of air for taking up moisture and this property increases with the temperature of the air. For instance, 100 cu. ft. of air at 60 deg. Fahr. will absorb approximately 0.082 lb. of water. If, however, we heat the temperature of this air to 100 deg. Fahr., it will increase to 108 cu. ft. and will absorb 0.305 lb. or about four times as much. This difference becomes much more marked when we heat the air to still higher temperatures. This action increases very materially the efficiency of both the direct and indirect fired types of drier. A fan is desirable to furnish draft in the case of any drier because of the larger volume of air which may be employed thereby.

The capacity of a direct-heat drier is greater than that of an indirect drier of the same size. Table IX below gives the average figures for direct-fired driers of various sizes when drying coal containing 10 per cent moisture.

TABLE IX. CAPACITY AND SIZES OF DIRECT FIRED COAL DRIERS

Size		Capacity*—	Power to operate with stack
Diameter	Length	tons per hr.	draft—hp.
3'0"	30'0"	4- 5	3
3'6"	35'0"	5- 6	4
4'0"	40'0"	7- 8	5
4'6"	45'0"	10-12	7½
5'0"	50'0"	12-14	10
6'0"	60'0"	17-20	12

*Based on coal containing 10 per cent extraneous moisture dried to 1 per cent moisture.

Auxiliary Equipment

In the cement industry it is quite usual to discharge the exhaust gases from the coal drier directly into the air by means of a stack or fan. The more modern practice, however, is to discharge the gases into a cyclone collector and from this into the air. The cycline collector is, of course, designed to catch the fine particles of coal which are carried out by the gases and so reduce the dust loss from the drier. The coal so collected is returned to the drier discharge pit, where it joins the main flow of coal on its way to the mill bins. By this arrangement there is virtually no loss of dust to the atmosphere, danger of fire is eliminated, and cleaner and more attractive surroundings can be maintained. In using a cyclone collector, however, care should be taken that no condensation of moisture takes place in this. Sometimes when these collectors are placed out of doors, the gases are cooled during the winter months to a point where the moisture condenses on the sides of the collector and the return of this to the coal of course gives trouble.

It is possible to fire any of the three types of drier mentioned by means of pulverized coal. The powdered coal must be burned in

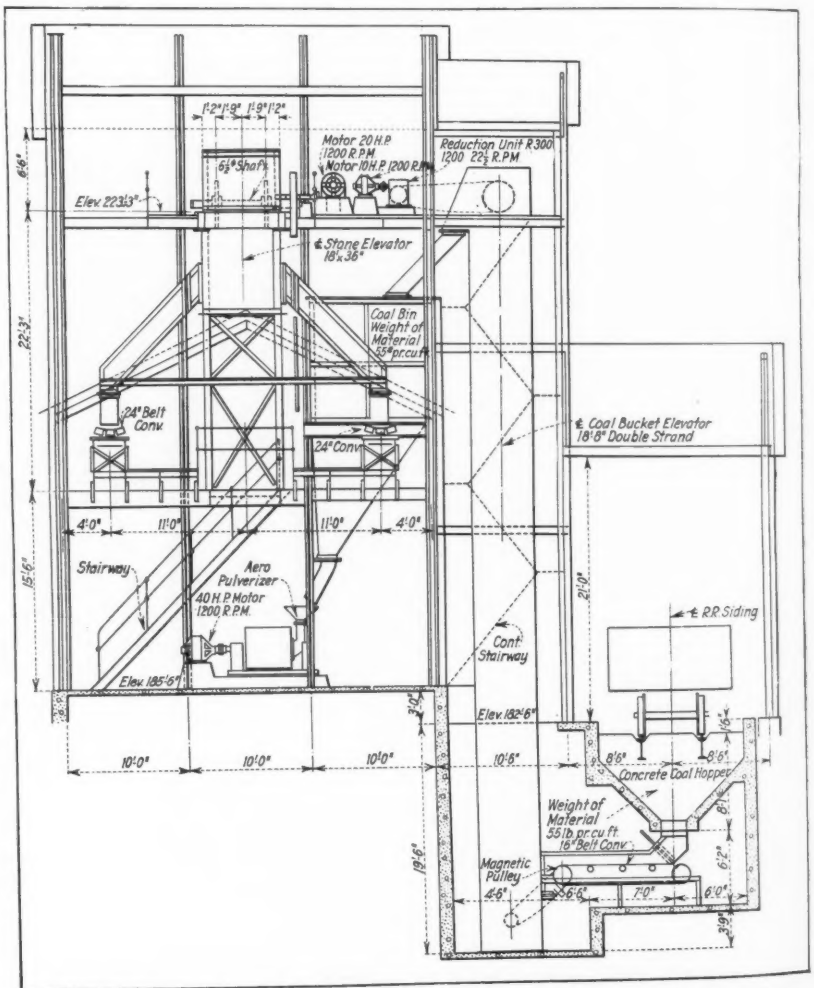


Fig. 12—Convenient arrangement of track hopper, feeder, magnetic separator, coal rolls and elevator. The latter discharges directly into the drier, no bins being employed

a dutch-oven or appropriate design, and care, of course, must be exercised that the flame does not extend so far beyond the nozzle of the burner that it will reach and ignite the dried coal. It is also well if pulverized coal is employed to place the driers in a separate room from the pulverizers, to insure against a possible explosion from a "flareback" of the pulverized coal flame. The atmosphere of the pulverizing room is often dust-laden and a sudden hot flame might ignite this.

The driers are usually fed from an overhead bin by means of some mechanical device such as a reciprocating cradle or a revolving table. The former is the more usual method. The feed is attached to the driving mechanism of the drier so that when the drier ceases to revolve the feed stops.

Run-of-mine, and even screened coal, often contains scrap iron, such as parts of mine machinery and cars, bolts, nuts, etc. These are likely, if they enter the pulverizer, to cause breakdowns or at least excessive wear to the latter. It is now therefore general practice to protect the pulverizer by the employment of a magnetic separator at some point before this. The form of separator generally used consists of a magnetic head pulley over which the conveyor belt passes. This serves to divert the iron from the coal discharge and so free the latter from the former.

Fig. 12 shows a convenient arrangement of track hopper, feeder, magnetic separator, coal rolls and elevator, the latter discharging directly into the drier, no bin being employed.

It is now quite general to include automatic recording scales at some convenient point before the drier. These are usually placed at either the discharge of the elevator which carries the coal up into the drier feed bin or else between the bin and the drier. The coal as it drops from the drier is usually led by a small hopper and spout into the boot of a bucket elevator and carried up into a bin which feeds the pulverizers.

Types of Pulverizers Employed

Four types of pulverizers are now in general use for pulverizing coal, while several more are in use at a few plants only. In the early days of the cement industry, the Griffin mill was quite generally used for pulverizing coal, but while still used to some extent in this industry, it is not, so far as we know, used to any extent in metallurgical or boiler work.

The types of pulverizer most commonly used are Fuller-Lehigh, Raymond, Bonnot, and tube mills. The first three mills mentioned are self-sufficient units, but the last mill requires that the coal shall be prepared for it by some other grinder which will reduce the coal to approximately 16- to 20-mesh material.

The tube mill is not so well adapted to pulverizing coal as the first mills referred to. The principal objection raised to the high-speed mills has always been one of repairs, as it is generally conceded that they are, so far as power goes, more economical grinders than the tube mill. Coal, however, is soft and easily ground if properly dried and the repairs in the case of the ordinary bituminous coal, fairly free from pyrite, are low, so that this objection to the high-speed mills will not hold here. In addition to the advantage of being a self-sufficient unit, the high-speed mills require less floor space and do away with the extra elevator and bin necessary for the two stage reduction.

(To be continued)

WHAT DOES IT COST YOU TO SELL?

William R. Basset, President
Miller, Franklin, Basset & Co., Inc.

DO YOU think of your business as a whole, or do you study each phase of it? Do you at the year's end compare your total sales with the total selling expense and strike an average which is your cost to sell for the business as a whole?

This year's percentage compared with last year's may show you that the cost of selling is going up or down. It is, however, a figure of merely historical interest. It comes too late to be of any value; and because it tells not "why" but merely "how much," it is of questionable value anyway.

Because the total selling cost was 5 or 10 or 30 per cent it does not follow that that was the cost of selling to any particular customer or in any territory. And yet the total profit is made up of the many small profits from each customer. It is only by subdividing to the necessary degree that cost figures are of value. Lump figures cannot tell "why," and you must know why a condition is wrong in order to correct it. In a dozen or so industries there are concerns that know their exact selling costs by customers, lines, territories and salesmen.

The first step is to set up a simple card memorandum account with each customer. On the credit side are entered the gross profit on all sales made to him. He is debited with the cost of selling at a predetermined cost per salesman's call. He is also debited with any advertising material furnished to him free, and with any special inducements which are necessary to get his business.

After a few months such records will show surprising things. You may find that your pet customers are not profitable. They may require too many calls, too much in the way of advertising or concessions, or they may buy only the narrow margin lines. Whatever the cause, such a record shows it definitely, and, knowing the cause, you are well started toward the cure.

By gathering the figures on the customers' cards in various ways you can find the cost of selling and the percentage of profit by territories or salesmen—even by lines of product in many cases.

I know one concern that stopped selling nationally and cultivated its home markets more thoroughly after finding in this way that the far fields cost too much to sell.

The Asbestos Industry

IN 1922 the domestic asbestos industry of the United States came to a standsill, according to a statement from the Department of the Interior through the Geological Survey. Only 67 short tons of all varieties of asbestos, valued at $10,120, was produced in 1922, as compared with 831 tons, valued at $336,968, in 1921, and 1648 tons, valued at $678,231, in 1920.

The Arizona field is the most promising in the United States. The industry there was developed rapidly from a small initial production in 1914 to its maximum in 1920, when it supplied asbestos worth 96 per cent of the total value of the domestic asbestos marketed. This great increase was due to a steady rise in the price of "crudes" which reached a maximum late in 1920 and early in 1921. In 1921 the general business depression greatly decreased the demand for asbestos and prices fell continuously throughout the year. In 1922 the plight of the Arizona miners was made worse by a further decrease in prices, due in part to keen competition with chrysotile from Rhodesia. The prices of "crudes" during the last five months have been remarkably constant, No. 1 Canadian being quoted at $500 and No. 2 at an average of about $290. Each of these prices is about 80 per cent over pre-war figures.

Information received from several sources indicates that there will probably be increased activity in mining asbestos in Arizona in the second half of 1923. Many deposits have been located within the San Carlos and Fort Apache Indian reservations, which were thrown open for entry only in 1921. Some of these deposits are under lease from the Bureau of Indian Affairs and have been partly developed.

One of the chief difficulties in marketing Arizona asbestos has been the work of bringing the producer and the consumer together. To assist in this work the Geological Survey made a canvass of the stocks of Arizona asbestos on hand and for sale on May 22. The returns show that on that date there was ready for shipment 312 tons of "crudes." Some of these stocks were in lots as large as 130 tons.

The Bermal Marl Fertilizer Co. plant at San Jose, Calif., showing the storage shed in the foreground

This Marl Plant Supplies California Farmers' Needs

The Bernal Marl Fertilizer Co. Has Expended $200,000 on This Pioneer Enterprise in California — Produces 400 Tons of Finely Powdered Marl for San Joaquin and Sacramento Valley Farms

By George Gautier
Alhambra, Calif.

ABOUT two years ago a group of Los Angeles and San Francisco business men formed a company for the purpose of exploiting the extensive marl deposits on the Bernal Rancho at Edenvale, which is nine miles southeast of San Jose, Calif.

Marl is impure calcium carbonate, the same as ordinary limestone, but instead of being of marine origin it has been precipitated from fresh or salt water which has passed over limestone rocks and taken the lime into solution. It is much softer than ordinary limestone and pulverizes readily. It is not used for burning and plastering lime but it has a large use for agricultural limestone and cement making.

Up to the time of the inception of this company, the use of marl on agricultural land was practically unheard of in California. The Bernal deposits had been worked in a desultory way for a period of 10 years or more by the owners of the Rancho, who sold as much calcium carbonate in the Santa Clara valley as they were able to quarry by hand and distribute by wagon.

Operations of the Bernal quarries by the new company began in the spring of 1921. At this writing the plant is producing 400 tons of finely powdered marl each working day, and is working to capacity to fill the fall lime needs of farmers up and down the great San Joaquin and Sacramento valleys.

Nearly $200,000 have been put into this pioneer enterprise of California. The bulk of the money went into the plant, including roads, trucks and preliminary work. Much has gone in advertising, and in directly telling the farmer where lime comes in on the farm. Direct advertising was effected by newspapers, the rural press and by exhibits at county fairs.

The results were that many big farmers began marling their soil as soon as the plant began turning out the finished product. This year the big farmer is giving repeat orders, and the smaller farmers, who sat by and watched the results gained by their bigger neighbors, are now buying for themselves.

A section of the quarry face

The deposit lies in rolling hills at an elevation of about 500 ft. higher than and 1500 yd. from the floor of the Santa Clara valley. The mills and bunkers are located at the base of the hills on a level with the

valley so that the material follows a downward path from the quarry to the time it is milled and loaded in trucks for delivery. The flow sheet of the plant is as follows:

A Bawling & Harnischfeger gasoline engine shovel with a ¾-yd. dipper, at the quarry excavates the material, which is chiefly marl with limestone intermixed. The shovel loads this aggregate on two 5-yd. Fageol trucks which haul it down hill for several hundred yards to a large hopper which holds 200 tons of material. A man at the hopper regulates the flow of marl into a No. 4 Jumbo Williams mill. On leaving the mill the limestone has been reduced to a diameter of approximately 1 in. The mill receives fragments up to 18 in. in diameter. This crushed aggregate, by means

Extra trucks waiting for work

A ¾-yd. gas shovel excavates the material

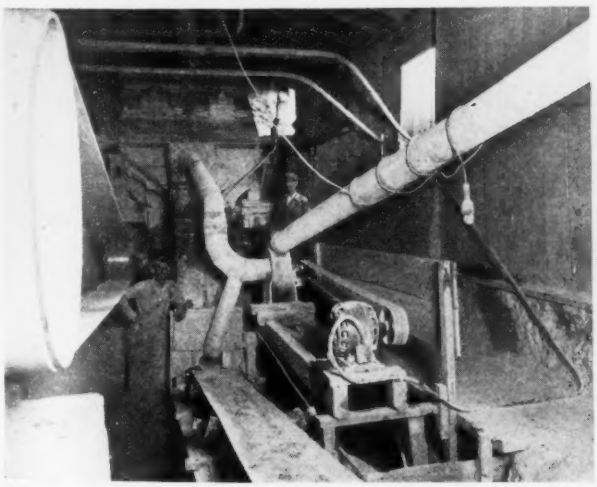
of a short 24-in. conveyor belt, is then run to a second hopper of 500 tons capacity.

From this hopper the aggregate is run through a No. 7 Williams mill. This mill reduces all particles to ¼-in. diameter. Directly from this No. 7 mill there is a 100-mesh Hum-mer screen through which all fine material falls to a conveyor belt. This belt carries the finished product to the loading bins. Coarse material falls from the screen to another short conveyor belt, and is fed to a third hopper which has a capacity of 50 tons. From this hopper the material runs into a No. 2 Williams mill, located just above the conveyor belt which carries the finished product from the Hum-mer screen to the bins. Thus the material leaving the No. 2 mill, which is now reduced to veritable powder with less than 2 per cent which would not pass through a 100-mesh screen, falls on the conveyor carrying the finished marl and is taken directly to the bins.

The Loading Bins

The loading bins, which are at the bottom of the hill, have a capacity of 1000 tons. Local shipments are made by truck which load under the bunkers in the same way as trucks load rock and sand at gravel plants. The company is now operating three Fageol trucks, and, during rush days, hires whatever extras it may need. Rail shipments are made in bulk and in sack.

The plant superintendent has erected a loading platform at Edenvale, on the Southern Pacific line. This platform is so arranged that trucks are permitted to dump their loads virtually in cars whether shipments are made by sack or in bulk. To provide adequate sacking facilities a large shed has been built beneath one corner of the bunkers. This shed is equipped with a battery of three Bates valve sacking machines, which insure rapid



The No. 2 Williams mill equipped with dust collector

The No. 4 Jumbo mill

sacking. There is also storage space in this shed to take care of 500 tons of sacked material.

Farmers Prefer Sacked Marl

Farmers ordering from Sacramento and San Joaquin valleys prefer sacked marl as they find it easy to handle and losses are not so likely to occur. Almost all of the shipments to the Sacramento valley are made in sack. This is because the material is shipped by rail to Oakland, a point on the San Francisco bay, then transferred to river steamers for various stops along the Sacramento river. It would be impossible to ship in bulk with such transfers.

As there is considerable rainfall in the northern section of the state during the deep winter months, when operations must be temporarily suspended, a large reserve storage pile has been found necessary. An 18-in. conveyor belt has been run out from the loading bins on a trestle about 300 ft. to a large inclosed shed of corrugated iron in which 15,000 tons of finished marl may be stored for winter delivery.

In the shed there is a loading machine in operation for loading trucks. In order that sack orders may be taken care of, a suction pump draws the material from the storage pile back to the bins in the sacking shed so that the Bates machines are provided with marl.

All of the machinery in the plant is electrically driven. The motors vary in horse-power from 10 to 200. A 200-hp. Westinghouse propels the No. 4 Jumbo mill. Fourteen men, including the gas shovel operator, two quarry men and three truck drivers are employed at the plant. As the plant is several miles from San Jose, bunk houses have been provided for the workmen.

All bins, motors, mills, belt and working machinery are carefully housed and covered as rain quickly dissolves marl and the wind whisks it into the air like dust. The quarry itself, which at present has a face of 40 ft., is covered with an immense awning during damp weather or when it is excessively hot. This permits the men to work in comfort in the summer and also in winter through light rains.

The main office of the company is at San Jose, Calif., in the heart of the productive Santa Clara valley. A. F. Ginoux of Oakland, is president and F. F. Gay of Los Angeles is the vice-president. A. J. Ginoux and Lloyd Stetson, both of San Jose, are respectively secretary and sales manager.

Publicity material for marketing agricultural marl

Agricultural Limestone Imported Free of Duty

TREASURY Department Ruling No. 39712 on agricultural limestone imported into Maine, reads:

Crushed and pulverized limestone

Limestone crushed for road building, etc., but not fine enough for fertilizing material, dutiable under paragraph 203 of the tariff act—if pulverized so as to be of the character chiefly used as fertilizer, free under paragraph 1583.

Treasury Department, June 28, 1923

Sir: The department is in receipt of your letter of the 23d instant and previous correspondence in regard to the proper classification of limestone similar to the samples submitted by you with your several letters and which you state is imported into different ports in your district under a variety of names and entered free of duty as a substance used for fertilizer under paragraph 1583 of the tariff act.

Paragraph 1583, under which "substances used chiefly for fertilizer" are admitted free of duty, carries a proviso that no article specified in Title I of the tariff act shall be free of duty under the said paragraph; and as paragraph 203 of the tariff act provides for the assessment of duty at the rate of 5 cents per pound on limestone "crude or crushed but not pulverized," you suggest that limestone represented by the samples is dutiable under the said paragraph.

A number of samples submitted by you representing different importations into your district were transmitted to the United States appraiser of merchandise at New York, and he reports that the approximate percentage of the samples passing through a 100-mesh sieve ranged from 39.40 per cent to 59.65 per cent and that based upon his examination of the limestone he was of the opinion that it was entitled to admission free of duty under paragraph 1583 of the tariff act, following the decision of the Board of United States General Appraisers in T. D. 36589, wherein it was held that ground limestone, the sole use of which was to fertilize the soil, was free of duty as a material used only for manure, under paragraph 499 of the tariff act of 1913.

The department is of the opinion that the provision in paragraph 203 covers limestone which has been crushed to varying sizes so as to be suitable for use in steel making, road building, concrete work, etc. (note T. D. 38359), and which in its condition as imported is not fit for fertilizing material.

In view of the foregoing and as the department is of the opinion that the limestone represented by the samples submitted by you is sufficiently pulverized to make it available for use as a fertilizer in its condition as imported, you are directed to liquidate the entries, the subject of your various communications admitting the limestone covered thereby free of duty under paragraph 1583.

Publicity for Lime in the Household

THREE recent and very severe thunder storms flooded hundreds of cellars and basements in Chicago and suburbs. The total rainfall of the three storms was 3.68 in. Immediately following these storms the Chicago newspapers carried first-page stories, in all of which prominence was given the recommendations of the health commissioner that householders buy unslaked lime and place it in damp basements to absorb the moisture and sweeten the odors which accompany damp basements.

"Even basements which were not flooded have absorbed a large amount of water in their walls," the commissioner said. "And as a health measure this method should be used. It also will prevent rusting of machinery. The lime is very cheap and afterward may be used as fertilizer. It should be kept in an open box."

The only unfortunate part of the incident is that the average householder knows less about how to buy unslaked lime than he does about buying locomotives; and we failed to notice any advertisements by lime manufacturers or the lime industry that would help him solve his problem. How much longer must we wait for some one to remove the scales from the eyes of producers and home owners alike!

New Wisconsin Pulverizing Plant Has Steel Conveyor Belt

Waukesha Lime and Stone Co. Rebuilds Pulverizing Plant Destroyed by Fire Last Year and Connects It With Crushing Plant by Steel Belt, Distinguishing the Operation as the Third in the Rock Products Industry in America to Employ Such Equipment

By George M. Earnshaw
Associate Editor, Rock Products

PERHAPS the most embarrassing question I have had asked me in my editorial travels for ROCK PRODUCTS are those pertaining to steel conveyor belts. Especially upon a recent trip through the Southeast, at practically 75 per cent of the operations I visited that use conveyors, I was bombarded with questions about them. The reason these questions were embarrassing is that I couldn't answer them; I had never seen a steel belt in actual use. But this may be accounted for by the fact that there are but three installations in the rock products industry in this country. These are at the plants of the Michigan Portland Cement Co., Chelsea, Mich.; the Penn-Allen Cement Co., Penn Allen, Pa., and the Waukesha Lime and Stone Co., Waukesha, Wis.

This interest on the part of so many operators brought about the realization that ROCK PRODUCTS could do its readers a service by investigating steel belts and telling how they can be used in our industries. So I went to the Waukesha Lime and Stone Co.'s plant at Waukesha, Wis., with the thought in mind of getting a story that could be captioned, "Experiences of the Waukesha Lime and Stone Co. with a Steel Conveyor Belt," but this idea was completely abandoned when Manager Halverson said: "We haven't had any experiences; we just installed the belt and went away and left it to its own devices. That was on December 6 of last year, and with the exception of one 25-min. period, it's been running 12 hours every day since."

So I came to the conclusion that about all I could do was to take a few pictures of it, find out how it was installed and how it operates. Incidentally, Mr. Halverson extended me the privilege of going through and taking pictures of the new pulverizing plant which replaces one destroyed by fire last year.

To make clear the conditions under which the belt operates and to make known the part it plays in the pulverizing operation, it is better that I first describe the pulverizing plant.

As the pulverizing department depended upon the crushing plant for its raw material, consideration had to be given to the location of the new plant with a view to how the crushed stone could be moved most advantageously from the crushing plant's bins to the drier in the pulverizing plant. Accordingly, it was erected at such a point near the crushing plant that the material could move from the bins through all the necessary processes of the pulverizing plant in a straight line.

The building in the foreground (with stack) is the pulverizing plant. In the background, the double-unit crushing plant

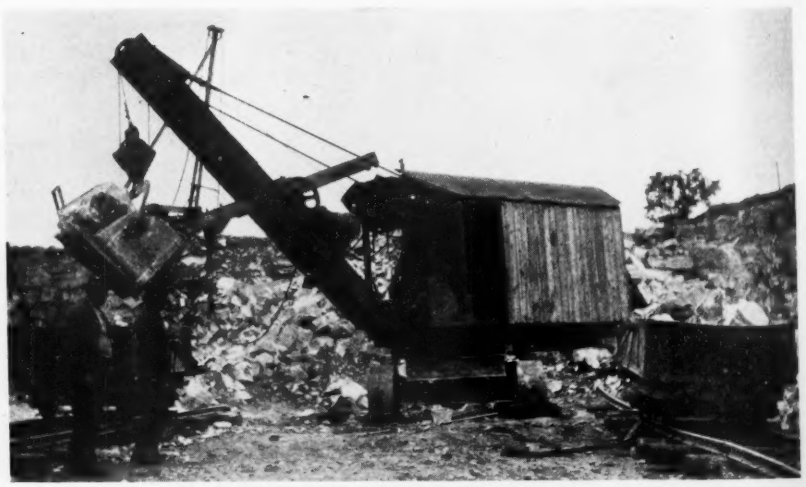
The building, measuring 40x200 ft., is of concrete, steel and timber construction and its covering is entirely of corrugated steel. The walls, as well as all machinery foundations, are concrete. It is divided into three distinct departments, the first, or the one closest to the crushing plant, houses the steel conveyor and drying equipment; the

General view of quarry and plants. The primary crusher—a 40x60-in. jaw—is on the quarry floor at left. Material is moved from it to the plant by a 48-in. by 166-ft. pan conveyor. Pulverizing plant in background

second, the grinding and separating equipment, and the third, the storage, including the packing and car-loading equipment.

The steel conveyor is the connecting link between the crushing and pulverizing plants and special bin gates are provided for feeding the stone to it in the crushing plant. The belt, which is of 178-ft. centers, runs between the two plants through a corrugated steel covered gallery having a runway its full length.

The conveyor empties directly into the drier, which is of the revolving type, 6 ft. in diameter and 50 ft. long, driven by a 20-hp. motor. From the drier the material is emptied into a 16-in. chain-bucket elevator of 32-ft. centers, which, in turn, empties into a bin of 20 tons capacity, mounted over the pulverizing unit. The dried material flows by gravity from the bin to a belt conveyor 24 in. wide and 5 ft. long, equipped with a Dings magnetic separator.

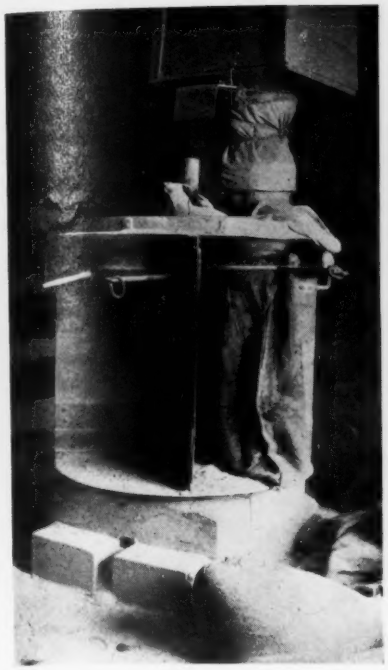


One of the small electric shovels (⅝-yd. bucket)

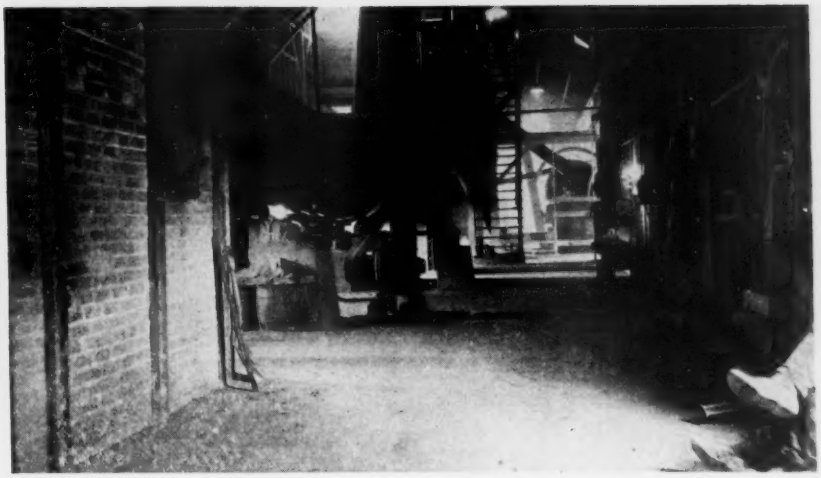
At the left, the new pulverizing plant; right, old crushing plant. The covered bridge houses the steel conveyor belt

When the original plans of the new plant were drawn up, it was planned to have the magnetic separator at the conveyor head pulley, discharge effected thereon from the steel belt. In consideration of the possibility of tramp iron getting mixed with the material after leaving the conveyor—either from the drier, elevator, bins or chutes—it was concluded that it would be more practical to install the separator immediately ahead of the pulverizer, so that there would be no possible chance of iron and steel getting into it.

Passing over the magnetic pulley the stone goes into a No. 2 Allis-Chalmers pulverator, which reduces it to the finest sizes required, excepting a grade of 85 per cent through a 200-mesh screen, which is ground by a tube mill. The product of the pulverator is received by a 14-in. chain-bucket elevator of



This is a homemade bagging machine for loading chicken and pigeon grits and terrazzo stone into burlap bags



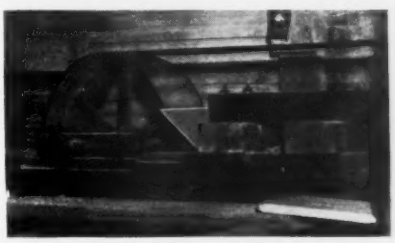
Interior of pulverizing plant. In the foreground at the left is the rotary drier; in the background may be seen the tube mill

42-ft. centers, leading to the screening room on the second floor of the building. The screening equipment consists of two double-surfaced Hum-mer electric vibrating screens. These machines produce five distinct sizes, the first being 100 per cent through 12-mesh, and the remaining four being of a coarser grade, designated locally as sizes Nos. 1, 2, 3 and 4. Each size is chuted to an individual bin and from the bins sizes 1, 2, 3 and 4 are spouted in 5-in. pipes to a homemade bagging machine, where they are loaded into burlap bags. These sizes are sold as chicken and pigeon grits and terrazzo stone.

The finest size—100 per cent through a 12-mesh screen—is chuted from its bin to a Smidth tube mill which reduces it so that 85 per cent passes 200-mesh, at the possible rate of 16 tons per hour. An individual elevator (enclosed) serves in the removal of the material from the mill to a bin mounted over a two-spout Bates packer. As the material is bagged it is removed either to storage or railway cars by hand truck.

The present capacity—30 tons per hour—is governed entirely by the pulverator. Plans have been drawn up for the installation of a second pulverator which will afford the plant an output of 600 tons per 10-hr. day. This installation, Mr. Halverson advised, will be made in the near future.

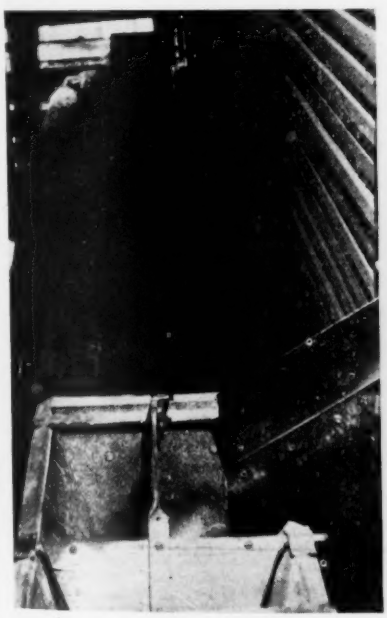
The last few paragraphs briefly describe the pulverizing plant as a whole. I will now describe the installation of the steel belt and give some of the details of its operation, which I hope will serve as answers to some of the queries put to me that I could not intelligently respond to while visiting plants in the South.



The loading end of the steel-belt conveyor. Note the steel plate to keep small stones from getting between the belt and pulley

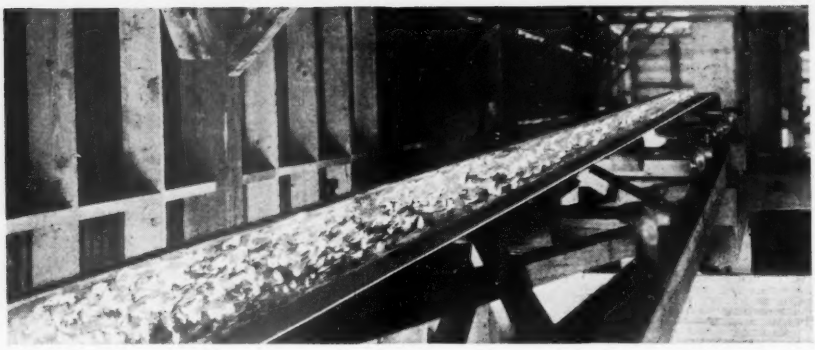
Perhaps the most common questions asked were: "Are they 'any good'? Are they successful?"

In answering them I believe it best to



One of the special belt-loading hoppers. This appliance is responsible for the proper feeding of the belt

This illustration gives a fair idea of the idler arrangement



Looking toward the drier from a point about the middle of the gallery

refer to Mr. Halverson's statement: "We have had no 'experiences.' We just installed the belt and went away and left it." That means that the belt at the Waukesha plant has handled approximately 74,160 tons of crushed stone since it was installed on December 6, last year, up until the time of my visit, July 1. This is on the basis of having operated 12 hr. every day, including Sundays, handing 30 tons per hour.

The actual installation, Mr. Halverson told me, was little different from that of any other kind of belt insofar as the structure and idler arrangement was concerned. The installation of the belt itself was done by the Sandvik Steel, Inc., service department, it being the Sandvik company's policy, as far as possible, to make all installations, thereby providing complete satisfaction.

This is because of the exactness required in jointing the belt, for should it be jointed untrue it would not operate successfully. It is surprising, however, to learn that the joint is a common lap, secured by countersunk rivets. Holes are punched with a specially-designed tool, permitting a speedy and simple jointing operation.

The Waukesha company's belt is 16 in. wide, is only 0.035 in. thick and travels at the moderate rate of 100 ft. per minute. This speed, Mr. Halverson explained, was determined by the length of the belt, with consideration for the amount of material required per hour at the discharge end. The requirement was 30 tons per hour, which was of course governed by the pulverator's maximum capacity. One hundred feet per minute is an unusually slow speed for these belts to operate, according to information given out by onee of the Sandvik company's representatives, for the average speed is usually 200 ft. per minute and at some operations they are operated at 300 ft. per minute. Thus, it will be possible to practically double the carrying capacity of the belt by merely changing the driving pulley. This will be necessary when a second pulverator is installed.

Those who attended the National Crushed Stone Association's convention in Chicago last January and saw the steel conveyor model operating were greatly interested in the scraper device with which it was fitted. This method of discharging the material appeared comparatively simple; it consisted merely of a steel plate, mounted on edge and held in place by movable uprights on either side of the belt at the desired discharge point so that it crossed the belt diagonally.

I was disappointed, in visiting the Waukesha plant, to find that this device was not used and that the belt simply discharged over the tail pulley, for it would have been interesting to have seen the system in actual use. The one with which the model was equipped was of the stationary type so that the load could be discharged at one point.

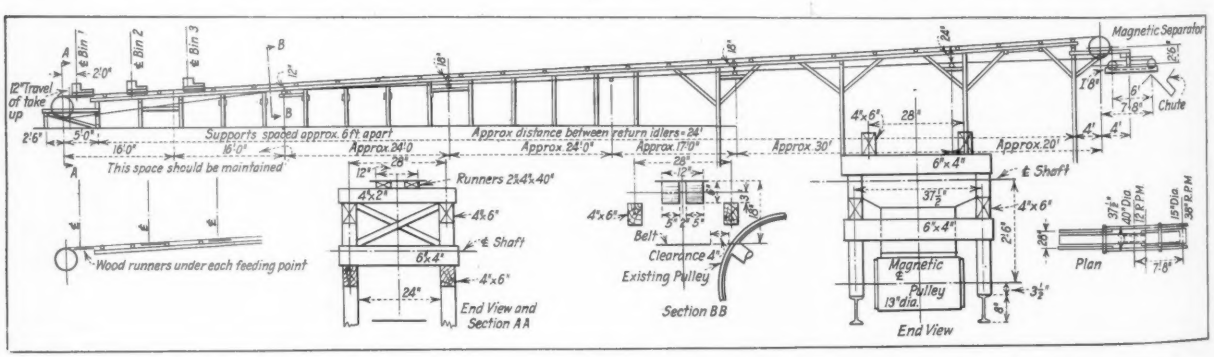
The following statements are Mr. Halverson's answer to a few of the questions I put to him: The belt is free from vibration; the original as well as the maintenance cost is less than any other type of belt I have used; it runs flat; the feeding hopper affords a consistent load at all times; it requires less power than other belts in my plant carrying less material.

The designing and construction of the Waukesha Lime and Stone Co.'s pulverizing plant was done by its own organization under the direction of Superintendent Wolf, who has had considerable experience in building crushing, screening, washing and pulverizing plants for both stone and gravel operations. Officials of the company are: M. O'Laughlin Gillen, president and treasurer; Edward E. Gillen, vice-president; H. M. Halverson, secretary and plant manager; F. C. Wolf, general superintendent.

Beautifying Old Quarry

ABANDONED stone quarries and sand and gravel pits are unlovely scars on the face of Nature, but sometimes they can be turned to things of beauty and made an important part of the park system of a city. There are several examples of the kind in the country, as at San Antonio, Tex., for example. News of one of the latest attempts to beautify an old quarry comes from Huntington, Ind., and is published in the Fort Wayne *Sentinel*:

"Martin Koch, stonemason and contractor, will beautify the old Keefer stone quarry, which is to be converted into a sunken garden and made a part of the city Memorial park. The work to be done, including stone walls, steps and arches, will cost $4485. Persons in this city have pledged about $5000 for the sunken garden, and seven men have promised to buy lots from part of the plot at $600 each, making a sizable total for the work. The purchase price of the lots will about pay for the entire purchase. More work will be done next year."



Plan showing structure for conveyor and details of idler arrangement. This is the original plan and the installation, as finally completed, differs inasmuch as the magnetic separator was installed just ahead of the pulverizer instead of at the conveyor head pulley

Questions and Answers

No. 81 **Washing Crushed Stone.**—Are there any companies that make a practice of washing crushed stone, and if they are doing it successfully, why is not the practice more common?—H. O.

A. There are companies that regularly wash crushed stone, but the practice is not more common because it is not so generally needed. In most cases screening is enough to remove the dirt, etc., along with the fines. There is a great deal of "dust" throughout the country that could be made into a valuable product if it were to be washed. The best machines for washing it seem to be those in which the material is run into a box with water and then the clean stone drawn out with drags or flights or a screw, while the dirt goes off with the overflow. It is difficult to wash the larger sizes of crushed stone successfully and get rid of the clay balls, as these are so hard that they will not dissolve in the ordinary washing process. In one case of which the writer knows, the stone is washed through a log washer, following the practice in the iron ore and phosphate fields. In another plant the material is allowed to dry and then screened. Drying breaks up the lumps of clay so that they will screen out. "Weathering" is the best method of which the writer knows to break up clay balls, and after they are broken up they can be removed by dry screening or rewashing.—E. S.

No. 82. **Asphalt Sand.**—How would you define asphalt sand? I know, of course, that it is the sand mixed with asphalt in making pavements, but just what must its characteristics be?—C. M. Y.

A. What is generally spoken of as asphalt sand is the fine sand which is mixed with coarser sand or grits when it is used in making asphalt pavements. The specifications vary according to the other material available. One specification of which the writer knows calls for 40 per cent minus 80-mesh and not more than 2 per cent on 10-mesh. Another calls for a minimum of 25 per cent and a maximum of 35 per cent through 80-mesh. In some places "blow sand," or the fine sand which has been blown and piled up by the wind, is used for mixing with asphalt, and is called asphalt sand. There has to be a certain amount of very fine sand used in making asphalt, or the product will ball up and become "greasy."—E. S.

No. 83. **Measuring the Water Used in Washing.**—We want to know the gpm. of water we are using in our washing plant. The centrifugal pump that pumps it to the plant has a rated capacity of 1200 gpm.; can we use that figure? What simple method is there of measuring the flow?—M. S.

A. The rated capacity of the pump is only for a certain number of revolutions and a definite head. Under different conditions it may pump a great deal more or a great deal less than the rated capacity. The only way to be sure of the amount used is to measure it, and there are several means of doing this, of which you can pick the one best adapted to your conditions. The simplest is to measure the time it takes to flow through a trough or launder. You can use this method if the tailing trough has a straight run for 50 or 100 ft. Measure off a distance on the trough and have someone drop a chip in the stream while you catch the time it takes to make the distance with a stop watch. Find the square inches in the cross-section of the stream by measuring the width and depth at several points and averaging and then calculate the flow from the rule that the quantity equals the velocity times this area. Reduce the quantity found by one-sixth, as the whole stream flows slower than the chip runs, on account of the friction on the sides. Where this method cannot be used, a weir or measuring box has to be made. In using a weir, the water ought to be run into a pool first, in order to get rid of the velocity of approach. It is usually easier to put in a box with a square or round outlet through which the water is discharged. The flow may be calculated from the height of the water above the center of the discharge opening. The flow into the box should not be too strong, or the stream will carry so many bubbles of air that the reading will be too high. The construction of such a box and the tables of flow in cubic feet for different heights above the center of the orifice may be found in Kent's "Mechanical Engineers' Pocketbook," and other books of the same kind. These books will also give the construction of weirs and the tables from which the flow can be figured. The right-angle notch and trapezoidal weirs are the types most used for measuring comparatively small quantities of water. None of the results obtained in these methods are exact, especially if the water contains sand and clay, but they are sufficiently so for all practical purposes.—E. S.

No. 84. **Garnets.**—Where do the garnets used in making "sandpaper" come from and how are they prepared for such use?—J. T. F.

A. Some of the garnet used for abrasives in the United States is imported from Spain, but the greater part of it is produced in this country. The most important producing plant is in the Adirondack mountains in New York, but garnet is found in many other parts of the country. There are garnetiferous schists in the Black Hills and garnet-bearing rocks in Arizona which might be of commercial value if the market were not so well supplied. At the Adirondack plant the rock (gneiss) is quarried and then broken down to ¼ in. by crushers and rolls. It is then screened and a part is treated on a special form of jig, the same machine that is used in coal washing, and the remainder is treated on a special machine which works like a jig except that compressed air is used instead of water. The clean garnet is sent to the makers of commercial abrasives, who size it and glue it to paper or package it. The process of sizing garnet has been highly perfected, the manufacturers making several sizes out of material finer than 200-mesh.—E. S.

No. 85. **Changing from Coal to Oil Burning.**—We have been advised to change from coal to oil as a fuel under the boilers at our sand and gravel plant. Do you think this a good idea? What are the comparative costs of coal and oil as fuels, and what other advantages are there in oil burning? Are there many oil-fired plants throughout the country?—B. M.

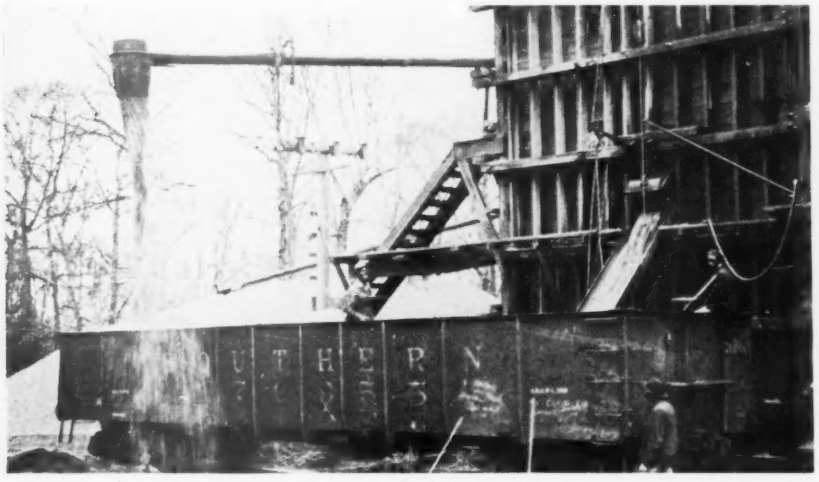
A. The writer's experience is that oil-fired boilers are very satisfactory where the consumption of power is fairly steady. In the case of intermittent use of power, as in a hoisting engine, it is not so good. As to the comparative cost, it depends on the relative prices of oil and coal laid down at the plant. A ton of coal is generally taken to be the equivalent of 2.9 bbl. of oil. If coal is $10 a ton, you can afford to pay almost $3.50 for oil. But even where there is no saving in money, it pays to burn oil for the relief from the dust and dirt and the handling of ashes. The efficiency of oil burning depends largely on the kind of burner used and the way that it is installed, and it will pay to have some one who has the knowledge and experience make the installation. Two kinds of burners are in use, one atomizes the oil mechanically and the other atomizes it with a stream of compressed air or steam. The mechanical atomizer is the newer form. Engineers who make a specialty of oil burning claim that the efficiency of the burner is largely a matter of the completeness with which the oil is atomized. They also claim that a heater should be a part of every oil-burning installation, as it is hard to burn heavy oils without preheating. There are a great many large and small users of power throughout the country who have changed from coal to oil, not so much to save money in fuel cost as to make the indirect savings which come from oil burning. Besides the lessened cost of firing, there is a saving in depreciation and linings and the boiler does not have to be blown out so often.—E. S.

Hints and Helps for Superintendents

Novel Use for Barrel

HEREWITH is illustrated a use to which barrels can be put at sand plants. The illustration shown was obtained at the sand plant of the Birmingham Slag Co. at Jackson's Lake, Ala.

It is easy to realize the kind of problem that was solved by the application of a barrel in this manner. The pipe line's chief purpose is to convey sand to a storage pile, the force of the water throwing it to the center of the pile. As the end of the line was directly over one of the loading tracks, all that was necessary to direct the flow to the car was a device such as the one applied. A common elbow would serve the same purpose but this would have been more expensive than a barrel and also would be more difficult to put on and take off. When there are no cars to be loaded, the barrel is removed and the pipe allowed to discharge into storage.

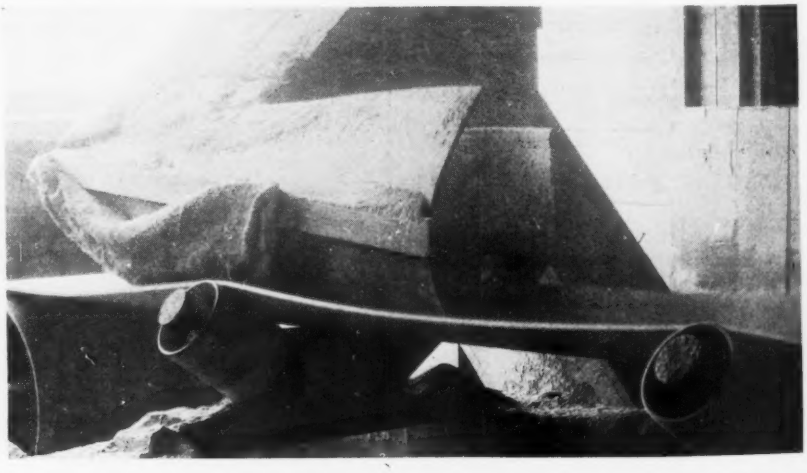


When there are no cars to be loaded the barrel can be taken off and the pipe allowed to discharge into storage

Feeding a Conveyor

FEEDING conveyors, without spilling any of the material, in the Krippendorf-Tuttle Products Co.'s plant at White Cliffs, Ark., is accomplished by having strips of old belting nailed to the spout in such a way that they serve as side boards without actually touching the belt itself.

The illustration shows how this was done. The square wooden spout was built to within 4 or 5 in. of the belt and to it were nailed two 3-ft. strips of 18-in. belt, one on either side. Each piece of belt was first nailed to a 1x3-in. board so that the strips of belt would be rigid. In this way they are not allowed to "ride" the belt for they are held an inch from it by the wooden strips. Thus, the arrangement serves its purpose in assuring a regular load, without wearing the belt out by coming in contact with it.



The wooden strips hold the strips of belting rigid and keep them from sliding on the belt and wearing it out

Conveyor-belt life savers are numerous and are important items in the economy of plant operation. Nearly every plant superintendent has some device which helps save wear and tear on the belts. The editors of ROCK PRODUCTS will be only too glad to receive letters from these superintendents and to pay for descriptions of every such device.

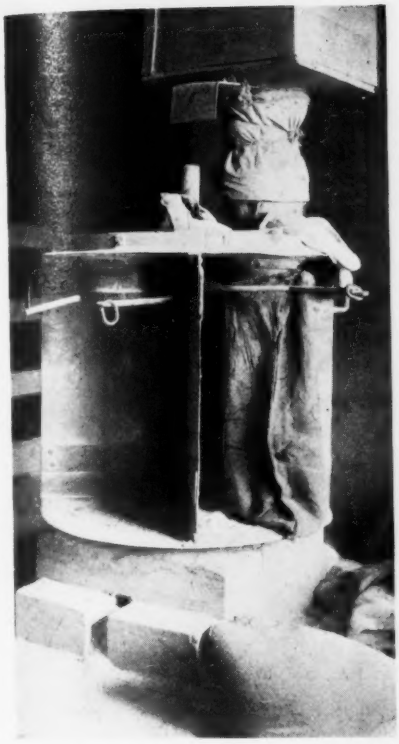
Another Homemade Bagger

THE homemade bag-filling device illustrated herewith is not an automatic arrangement and its inventor had no intention of revolutionizing the industry in so far as baggers are concerned. It is simply a revolving table fitted with a device for holding a bag while the operator opens a slide and allows the bag to fill.

The bagger is in use at the Waukesha Line and Stone Co.'s plant at Waukesha, Wis., and was designed by one of the company's men. The company produces, in addition to agricultural limestone, several grades of chicken grit and terrazzo stone and it is for the loading of these products into burlap bags that the bagger is used.

It consists of a circular piece of ¼-in. steel plate about 36 in. in diameter for a base; a 2-in. bar 4 ft. long through its center and a plate like the base-plate mounted on the shaft at the top about 3½ ft. from the other plate. Between the two circular plates are inserted steel plates lengthwise in such fashion that they divide the space between the base and top plates into four compartments. At the top of each of these is a 12-in. opening provided with a flanged spout and working in connection with the spout are two hinged rods which, when moved toward each other, press against the sides of the spouts. These are responsible for the holding in place of the bags while being filled.

A small wooden hopper under the bins is fitted with a spout equipped with a slide gate and is directly over the bagger so that its spout serves any one of the four



This homemade bagger for sacking chicken grits and terrazzo stone is a time saver for the Waukesha Co.

openings in the bagger as it revolves. While not automatic in any way the machine is a great improvement over the old method of filling the bags with shovels.

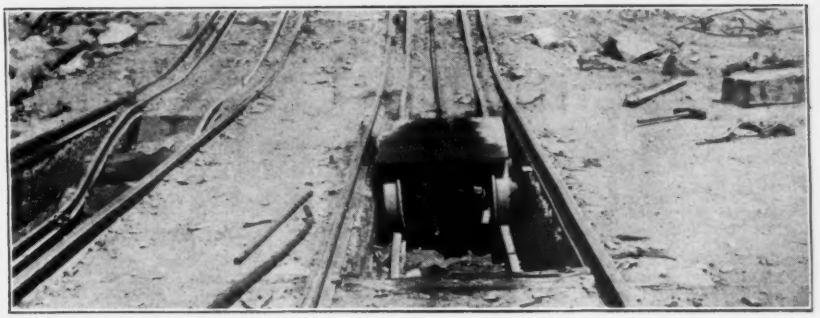
Device Saves Coupling and Uncoupling Cars

EVERY quarry operator is familiar with the hazard involved in the operation of an incline railway from the quarry to the crusher. Many serious accidents have occurred at the foot of the incline in coupling and uncoupling cars. Herewith is shown a device in use at some Connecticut quarries which eliminates the necessity of coupling and uncoupling the cars.

The particular installation shown is at the Farmington plant of the Hartford Sand and Stone Co. A Milwaukee gasoline locomotive brings one car at a time to the foot of the incline, which is operated with a balanced hoist, one car descending while the other ascends.

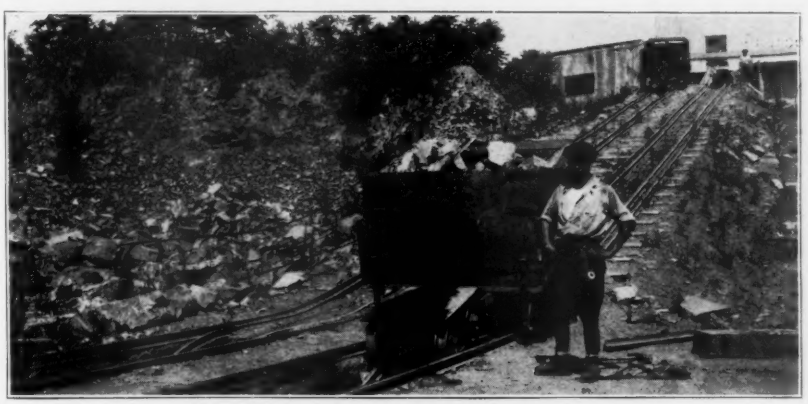
The tracks are double rail, a 3-ft. gage for the quarry car and a 2-ft. gage for the dolly. On reaching the level track at the foot of the incline the dolly track descends to a pit, so that the quarry car can be run in ahead of it. The series of views herewith tell the story better than words.

Besides the avoidance of a hazard in car handling, a device of this kind eliminates one man for coupling and uncoupling the cars. This installation was designed and installed by Albert L. Worthen, vice-president of the Connecticut Quarries Co.



Dolly car on 2-ft. gage inside 3-ft. gage quarry track

Gasoline locomotive bringing car to foot of incline



Dolly car coming up behind quarry car

Empty car and dolly returning down the incline

Lubrication of Excavating Machinery*

Helpful Suggestions for the Superintendents of Quarries and Gravel Pits

EXCAVATING machinery is subject to probably as severe service and operates under as difficult and injurious conditions as any equipment we will normally have to deal with. Exposure to the weather and frequent contact with mud, dust and such abrasive and corrosive materials as ashes, cinders and ore, etc., subject the working parts of the average power shovel, dragline excavator or dredge to a rate of depreciation that is oftentimes far above normal.

To counteract the injurious effects of such exposure, machinery of this type is rigid in design and is constructed to withstand acids, alkalis, abrasion and corrosion to the highest extent. It stands to reason, however, that regardless of mechanical features or the chemical nature of the metals used, wear will occur relatively rapidly unless a protective element in the form of a lubricant is effectively applied to all machinery.

Therefore, lubrication in the field of construction engineering is a paramount feature if we desire our cylinders and bearings to resist scoring in event of the entry of abrasive particles of foreign matter; our gears to operate properly without abnormal wear in the presence of acid fumes or dust; and our wire ropes and chains to function safely day after day without the possibility of broken or rusted strands, or links.

Lubrication

Steam Cylinders—In order to keep power shovels, dredges, etc., in continuous operation, it is decidedly essential to give careful attention to their lubrication at all times. Perhaps the most important detail is the lubrication of steam cylinders. In any of the above machines, which are steam driven, the existing conditions and methods of operation will be such that if any but a high grade, properly compounded lubricant is used, the cylinders will suffer accordingly.

Steam used on such machines will, in general, be of comparatively low pressure (of from 100 to 150 lb.) and will have quite an extensive moisture content. Although steam is taken from the highest part of the boiler, it will frequently be relatively wet when it enters the header. Furthermore, line condensation and moisture content will be high between the boiler and engines, with a corresponding decrease in pressure, due to the fact that steam pipes are often not covered to any great extent, and the engines are frequently subject to intermittent operation. As a result there will almost always be an accumulation of water above the throttle valves, prior to starting the engines, depending in amount upon the length of time they have been stopped. Now, if the cylinders are not covered with a tenacious film of properly compounded lubricant, the admission of these slugs of water will tend to wash the lubricant from the wearing surfaces, and for the next few strokes insufficient lubrication will be possible and scoring and abnormal wear may occur. The constant repetition of the above will not take long to produce compression losses and inefficient operation of the entire machine due to steam leakage past the piston rings. Groaning of the engines or rattling of the valves on their seats may also occur in extreme cases.

It can therefore be appreciated that our problem is to select and use a grade of cylinder oil which contains a sufficient amount of high grade animal or fixed oil to promote the formation of an extremely tenacious film of emulsified lubricant, which will adequately resist the washing action of any water that may be present. The base of this lubricant should be a medium viscosity, highly adhesive, steam refined cylinder stock. For this purpose a comparatively high compound cylinder oil of about 130" Saybolt viscosity at 210 deg. Fahr. has proven to be most satisfactory.

In order to efficiently lubricate such steam cylinders the oil should be delivered by a positive feed lubricator, preferably of the force feed type, via suitable atomizers. Hydrostatic lubricators could be used, were the engines to operate continually, but the usual intermittent service involved would either require constant closing and opening by the fireman or else a waste of oil would follow if the lubricator were left in service while the engines were stopped. The location of the oil pipes and atomizers in the steam lines is also important. These points should be approximately 6 ft. back from the throttle valves. In cases where a steam thrusting engine is located on the boom in certain types of these machines, the oil line often enters the steam pipe much further back from the throttle, with the result that in the event of leaks at the ball or swing joint there will be considerable loss of oil as well, with subsequent insufficient lubrication unless the leak is stopped.

General Lubrication

Where excavating machines, etc., are equipped with caterpillar tractors the lubrication of link-pins and rollers is also an important factor, in order to insure against excessive friction losses and power consumption. Automatic lubrication is generally regarded as the most satisfactory, the lubricant being furnished from internal reservoirs located in the treads and rollers. For this service a relatively heavy pure mineral lubricant having a viscosity of about 200" Saybolt at 210 deg. Fahr. is most suitable.

On certain types of railroad shovels and other excavating machinery, journal boxes much similar to those used in railway service is installed on traction wheel journals. As a general rule these journals, although they are not subjected to the same high speeds and lengthy periods of operation as railroad journals, are lubricated in a similar manner, i.e., by packing the journal box with wool waste which has been saturated in mineral oil. For this purpose a 300" to 500" Saybolt viscosity (at 100 deg. Fahr.) pure mineral oil, as recommended for general bearing service hereafter, will be suitable.

The lubrication of other wearing parts on the average excavating machine can be well taken care of by means of a medium viscosity straight mineral oil or a high grade compression cup grease. Many builders recommend grease lubrication and accordingly equip their machines with compression grease cups. Grease for this purpose should be free of acid or alkali and should contain no filler such as talc or asbestos, which would tend to clog the oil grooves. External lubrication on excavating machinery, whatever its nature, is necessarily a difficult proposition, and enough dirt, dust and abrasive matter will work its way into the bearings, without the addition of any more in the form of improperly compounded greases.

When engine bearings, etc., are lubricated with oil, the viscosity of the latter should be in the neighborhood of 300" to 500" Saybolt at 100 deg. Fahr. For electric motor bearings, however, involving ring oiling systems, a lighter oil will be best, ranging from 180" to 200" viscosity. The method of applying engine oils is worthy of comment.

Hand oiling is frequently customary.

*Abstract reprinted from the June, 1923, issue of "Lubrication," published by The Texas Co., 17 Battery Place, New York City.

but is not recommended due to the possibility of oil holes becoming clogged with dust and dirt, and the bearings suffering accordingly. It has been proven that sight feed oil cups are probably the best equipment to use. They should at all times be so covered that the contents are kept free from contamination.

In dredge operation frequently marine equipment will also be involved. In general, greater care should be observed in routine operation and lubrication due to the oftentimes more severe and exposed service to which dredges are subjected.

Internal Combustion Engines

Where excavating machinery, such as power shovels, etc., are driven by kerosene or gasoline engines instead of steam, lubrication develops into a problem similar to that involved in the modern tractor or automobile. For such service the motor lubricant is of chief importance and should be given careful consideration. Usually some form of force feed lubricating system is involved which passes the oil through a hollow drilled crankshaft under sufficient pressure to reach all wearing parts. On gasoline engines a straight mineral motor oil of from 500″ to 750″ Saybolt viscosity at 100 deg. Fahr. will be suitable, the grade selected being dependent upon the weather and operating temperatures. For tractor type engines a somewhat heavier lubricant should be used, the viscosity of which varies from 70″ to 110″ Saybolt at 210 deg. Fahr.

Gears, Chains and Wire Rope

In order to insure the preservation of such equipment and maintain operation at the highest state of efficiency, it is essential to keep all gear chains and wire rope well coated with a suitable compound, which will serve not only as a lubricant, but also as a preservative. Wire rope in particular requires attention, due to the possible hazard involved if internal strands are allowed to rust, wear and corrode. Although wire rope as constructed today contains a hempen core which is usually soaked in lubricant prior to the winding of the steel strands, the theory that this core will serve to adequately lubricate the strands and prevent wear, rust and corrosion during subsequent service should not be relied upon. Therefore, the exterior surface of the rope should be treated at frequent intervals with a suitable lubricant and preservative, which is capable of penetrating to the innermost strands during operation and not only re-lubricating the core but as well preventing wear at the points of contact of the strands. Such a compound should be:

1. Plastic at all temperatures.
2. Capable of being readily applied in a thin film without undue heating.
3. Free from acids and alkalis.
4. Non-evaporative.
5. So tenacious and adhesive as to not drip or run off under abnormal pressures or temperatures.
6. Insoluble in water.
7. Non-hardening.
8. Capable of resisting the entry of dust, dirt, chemical fumes or salt water.

The most suitable lubricant for wire rope is a pure petroleum compound having a viscosity of about 1000″ Saybolt at 210 deg. Fahr. Although in some cases increased viscosity up to perhaps 2000″ may be necessary.

Gears and chains should be treated with a similar compound. There is relatively no hazard involved if they are neglected, but wear will develop abnormally accompanied by excessive noise and rattling, and corrosion of the wearing surfaces, especially if they are exposed to sea air, or acid fumes.

Whatever may be the type of machine involved, the setting and aligning of gears is important, and all teeth should so mesh that there will be a uniform and constant application of power and smooth, quiet operation in order to insure against jerky action. This latter would tend to produce strains and abnormal wear, not only on the gears, but also on other driving mechanisms. To attain best results in applying the gear lubricant the surfaces of all teeth should first be washed with kerosene or some other solvent, the lubricant being then heated and brushed or poured lightly onto the wearing surfaces while the gears are in slow rotation. Pressure between the teeth will adequately spread the lubricant, if it is applied in the proper amount, and it should not be forced over the sides of the gears unless the film is too thick. In this event the intensity of the application should be decreased.

Recommended Specification for Quicklime for Use in Causticizing

THE manufacture of caustic alkali consumes a large tonnage of quicklime annually. For this purpose a very pure grade of lime is required. Purity is determined not by the total content of calcium oxide but rather by the content of calcium oxide which is available in the process for which the lime is used. A careful study of the requirements of the users of the quality of lime which is actually being used, and of the possibilities of production, have led to the establishment of the figure 85 as being a fair standard for the percentage of available lime.

Unlike most materials which are bought on specification, chemical lime is more valuable if it has a higher degree of purity than that required by the standard and less valuable if it has a lower degree. For this reason it has been recommended that a bonus and penalty clause be inserted in the contract in order to take care of variations from the 85 per cent. While the material is less valuable but can still be used if the purity falls below the standard, there is a point reached eventually when the value of the material becomes such that it is poor economy to use the lime for this purpose. A careful survey of the situation has led to setting this figure at 70 per cent.

In working up the details of this specification the Bureau has been assisted by an Interdepartmental Conference on Chemical Lime, composed of representatives of various government agencies. The specifications have been partially approved by the National Lime Association, representing the producers, and by the Technical Association of the Pulp and Paper Industry, representing the largest group of consumers of this kind of lime.

This specification is embodied in Circular No. 143 of the Bureau of Standards, entitled "Recommended Specifications for Quicklime for Use in Causticizing." Copies may be obtained from the Superintendent of Documents, Government Printing Office, Washington, D. C. The price is 5 cents.

Soil Doctors by Special Train

BECAUSE seven acres in every ten of Maryland farm land are sick for want of lime, the University of Maryland is sending out a corps of soil doctors who will tour the state on a special train provided and operated by the Baltimore & Ohio railroad.

In addition to giving talks on liming and soil-building, soil samples brought in by farmers will be tested, and sufficient lime to properly treat one acre will be furnished the farmer direct from the train, which will have attached several carloads of representative liming material marketed in the state of Maryland.

Farmers will be advised as to proper selection of market materials on basis of all elements of cost which are, as stated by Dr. A. G. McCall, who has charge of the campaign: "(a) cost delivered to the farmer's station, and (b) expense of hauling and handling from the railroad station to the farm." He further points out the general principle that the effect of these factors is to make dilute types of soil limes more economical for those farmers situated close into the freight station and to limit the more distant farmers to choice of concentrated types.—*Agricultural Lime News Bulletin, of the National Lime Association.*

Our Friends Take a Crack at the Lime Industry and "Duck"

Example of Misunderstanding that Producers of Lime Must Help Correct

A PROMINENT lime producer has asked us to give some prominence to a couple of editorials in a contemporary journal which serves the chemical industries. Since the chemical industries are big lime consumers, what this journal, as a spokesman for the chemical industries has to say is of considerable interest to lime producers. It is obvious that *Chemical and Metallurgical Engineering* makes its crack at the lime industry without much intimate knowledge of the lime industry or its problems, but it has registered at least one good point that progressive lime manufacturers can endorse. The two editorials follow:

Is the National Lime Association Missing a Great Opportunity?

Several weeks ago *Chem. & Met.* published its report of the convention of the National Lime Association. Our editors were immensely impressed with the well-planned, comprehensive program of research that had been carried out during the past year. Three problems each having a vital bearing on the future health of the industry had been attacked and practically completed within the year. In addition the work on the fundamental properties of lime was vigorously pursued at the central laboratory. The program reflected credit on the members of the association for their farsightedness in supporting this research.

And now we begin to hear rumors that the association will make a drastic cut in its research appropriation, that it has definitely segregated the field work of the association from the central office which includes the research department. This latter step obviously limits the effectiveness of even the skeleton of the technical department that may remain. Perhaps if the industry had invested in an unusually sterile program of research, the policy of retrenchment and vacillation might be understood. But the technical department has brought important problems to fruition in a relatively short time—the lime partition block, quick-setting lime plaster and the use of lime in both cement and asphalt roads. In carryng out this program the active co-operation of some of the best research men in the country had been enlisted by placing National Lime Association fellowships with them. The whole program showed statesmanship of a high order.

Yet the association will not indorse the program. It has spurned a treasure. Were the damage alone to the association or to the industry that supports it, the matter would have less of our concern. But it is of more fundamental portent. Because of it trade association work will receive a black eye with technical men. To do good work these men must be assured of stable, continuous support. They should not have to think of next year's appropriation or the lack of it. But consequences such as are threatened by the Lime Association intimate that the technical man is insecure in association work, so insecure that he will not easily be enticed into it. And from another angle the abandonment of research would be damaging. It will indicate to other associations that the Lime Association has found research unprofitable.

Is it too late to reconsider? Is all this damage to be done because the least progressive in the industry cannot see the great benefits that come from vigorous, unified, centrally organized scientific and technical work? We most earnestly hope not.

The Lime Industry and Our Editorial Musket

We feel like the householder who shot at the burglar and severely injured his wife. Several weeks ago we loaded the editorial musket for the recalcitrant members of the lime industry and when the smoke of the explosion had cleared we heard cries emanating from the direction of the National Lime Association.

We endeavored in the editorial to express our extreme disapproval of the opposition to the constructive program of research that has been pursued by the Lime Association. We are glad to learn that the opposition was not in evidence at the secret executive session of the association and that the program which won the enthusiastic approbation of all technical men attending the meeting was approved with an increased budget for the coming year. The industry is to be congratulated for thus supporting the association work. We are also glad to learn that the increase in the budget for field work is not to come out of the research budget. That would have been a serious mistake.

So long as the industry is willing to follow such leaders as Charles Warner, the past president, and George B. Wood, the present president of the Lime Association, it will progress and grow in usefulness as it did last year. The random destructive criticism of some men in the industry and the unwillingness to co-operate on the part of others will always be a handicap, a disquieting influence, and it is these men at whom *Chem. & Met.* is shooting the editorial musket. We were afraid they had thrown a wrench into the delicate machinery of research. We rejoice at their impotence and pray earnestly for their early conversion.

Excerpts from Rock Products Correspondence

THE Island Sand and Gravel Co., Columbus, Ohio, is duplicating its present plant, which has an annual capacity of about 150,000 tons. The new installation will consist of a Sauerman dragline scraper, operated by a two-speed, two-drum Thomas electric hoist. The new plant will be ready for operation about October 10.

* * *

C. M. Kelly, Valley City Stone and Gravel Co., Grand Rapids, Mich., must have been "rather hot under the collar" when he penned us the following (with which we heartily agree, as witness our editorial page—this issue and many issues):

"There is a movement on foot to have the state of Michigan build and operate its own cement plants. Dealing with farmers in the purchase and exploiting of wayside gravel pits is a political pretense of economy and the 'Dear Public' fall for it, or rather I should say in the denatured speech of sub-normal Americanism 'The Public be damned' when their quasi-representatives jockey with their rights and dollars. Why not advocate wayside pits with all their masked overhead to satisfy maintenance needs of a community, yet staunchly defend the legitimate producer for all construction requirements? The legitimate producers in the fullest measure meet the federal, state and county taxes—and defying both insult and injury from petty officials who burden their industry—help pay the salaries of these creatures, who do, and do and do so much statistically for the denatured American public. While government officials cease to operate the railways—in line with good business and economy—we observe the un-elected but deputized highway subordinates running wild with their false statistics of road construction costs—searching the country for wayside gravel pockets—a political-pebble pest—destructive to the established business of the legitimate sand and gravel producer."

* * *

The Conlin Marble Co., Inc., Tuckahoe, N. Y., is about to erect a crushing plant and grinding plant with a production of 200 tons per day.

* * *

William McGrew, manager of the L. & M. Stone Co., Prospect, N. Y., (father of "Brownie" McGrew of the Allis-Chalmers Manufacturing Co.) writes: "We are not so big in our line as some others, but we just pulled off a 46-hole shot (depth of holes 40 ft.), using four tons of du Pont gelatin dynamite. We dislodged from 27,000 to 28,000 tons of the famous Trenton limestone."

* * *

The Bershire Gravel Co., Lenox, Mass., expects to relocate its plant this fall and about double its capacity.

* * *

R. S. Cade, Canton, Ohio, writes: "I also manufacture concrete products and make a specialty of window and door frames with trim (inside and outside) attached—all of concrete—the cost being less than wood. When finished they look like steel trim."

* * *

The Greer Limestone Co., Morgantown, W. Va., is increasing the capacity of its plant at Greer, W. Va., on the B. & O. by the installation of a 48x60-in. Kennedy jaw crusher. Other remodeling work is in progress.

* * *

E. J. Leap, owner of the Leap Ganister Rock Co., Madley, Pa., writes: "We are having a very good season and expect to break all previous records in output. We are increasing our capacity 35 per cent.

More Evidence of Live-Wire Gravel Producers

T. E. McGRATH, commenting on ROCK PRODUCTS' reference to the recent salesmen's conference of his company, writes the editor: "The McGrath organization has endeavored, through its progressive policy, to place the sand and gravel industry on the high plane it should occupy with kindred industries in the business world." This organization certainly is doing its share, for the July 18 issue of the *Illinois State Register*, Springfield, Ill., has an illustrated article by C. D. Graves on "Little Journeys to Illinois Industries" which contains the following significant remarks:

> Those of us who unthinkingly believe there is no romance in sand and gravel have another guess coming. When you see what I have seen in the way of equipment and plant facilities to properly prepare sand and gravel for the modern market, you will wonder what has become of the sand bank and gravel pit of bygone days.
>
> When I tell you that three brothers, the McGrath boys, of Lincoln, Ill., have developed a washed sand and gravel business in 16 years, from a very small capital and an output of one or two carloads a day un'il at the present time they have half a million dollars invested with a capacity of 180 carloads a day from five modern plants, you will realize that there is romance even in sand and gravel.
>
> * * * * *
>
> The McGraths maintain, possibly the finest and most commodious offices in the city of Lincoln and are always in the forefront in boosting for their city and Illinois.

Let's hear how other progressive producers are helping to put the sand and gravel industry on the map!

Cost of Grinding Limestone in Small Plant

THE following summary of the cost of grinding limestone in a small portable plant is taken from the Freeport, Ill., *Standard*. It will be noted that the cost of the finished product per ton is higher than the cost of the same material f. o. b. cars, as quoted in the market reports of this issue, and also that no supervision or depreciation or depletion has been figured in the cost.

	No. 1		No. 2
Tons ground	73¾		57½
Days worked	3		5
Total hours labor	176		180
Labor hours per ton	2.38		3.13
Labor cost	98.26		87.14
Labor cost per ton	1.06		1.52
Fuel used kerosene 42g	5.04	32g	3.84
Fuel used gasoline 42g	8.40	32g	6.50
Fuel used oil 6g	4.50	7¾g	5.81
Repairs	No Records		
Cost per ton (fuel, oil, repairs, misc., etc.)	.24		.29
Total cost per ton	1.30		1.80
July 14	1.25		1.62
July 21	.89		.92

Bids on Rock for Missouri State Highways

THE St. Louis *Globe-Democrat* of August 12 says:

"The state highway engineers opened four bids today for supplying the state with 110,000 cu. yd. of crushed limestone for use on the highways of the state. The lowest bid was made by the Charles Kolmer Stone Crushing Co., of Topeka, Kan., its offer for the entire contract being $1.75 per ton on the dump at the quarries at Blue Springs and Sweet Springs, Saline County, Mo., and quarries near Blackwater in Cooper County, Mo. The engineering department will recommend to the commission that that low bid be accepted.

"Other and higher bids were submitted by the Chouteau Stone Co., of Kansas City; J. P. Haley, of Cape Girardeau; and F. M. Buler, of Topeka, Kan."

Edmund Shaw Joins Rock Products Editorial Staff

IT is with pleasure and genuine satisfaction that we are able to announce that we have persuaded Edmund Shaw to give up his private consulting practice and devote his wide knowledge and experience to

Edmund Shaw

the benefit of the whole industry through the medium of ROCK PRODUCTS. From now on he will share equally with the present editor the labors, responsibilities and honors of editing ROCK PRODUCTS, and as editor, of serving the industry in every way within the power of our organization to do so.

Mr. Shaw needs no introduction to ROCK PRODUCTS readers, for he is known to a host of them personally, and to most all of the others by reputation and through his work and his contributions to the literature of the industry. He is a technically trained mining engineer, with a world of experience in crushing, screening and washing problems, which the last few years he has utilized in helping the sand and gravel industry in some of its operating problems.

The addition of Mr. Shaw to our staff gives ROCK PRODUCTS an exceptionally well-rounded organization to serve the industry in every way that a live trade journal can possibly serve its industry; and such ways of service are many. Every member of our organization now—both editors and advertising staff—is a technically trained engineer with special experience in and expert knowledge of one or more branches of the rock products industry.

Our office, our staff and all our facilities are available to anyone in the industry. We have no side lines nor other interests than ROCK PRODUCTS and it is our single purpose to make ROCK PRODUCTS of the utmost service and value possible to the great and growing and prosperous non-metallic mining industry of America.—NATHAN C. ROCKWOOD, Editor and Manager.

Tennessee Phosphate Plant to Be Auctioned

THE holdings of the Tennessee Agricultural Chemical Corporation, which are five miles east of Centerville, Tenn., on the Columbia pike, are to be sold at public auction on September 8. They comprise the mineral rights to 328 acres of land, a dragline excavator, a dinky locomotive and 96 wood and steel cars with all other personal and miscellaneous property of the company, says the Centerville, Tenn., *News*.

It is expected that there will be a number of bidders, as representatives of various companies have been making inspections of the property. Among these is a representative of an association of Illinois farmers, and it is expected that this association will be a strong bidder for the property. The sale is in charge of E. W. Cooper, special commissioner of the U. S. district court for the Middle District of Tenn.

This property is well known and its sale is bound to attract considerable attention among producers and consumers of phosphate rock, especially at this time when there is some hope of a revival in the industry.

Cement Freight Rate Hearing in Kansas

THE following is from the Topeka, Kas., *Capital* of Aug. 8:

"A hearing on cement freight rates before an examiner of the interstate commerce commission will be held in Topeka, Oct. 1, according to notice received by the Topeka Traffic association. The hearing is on two complaints filed by the Missouri Portland Cement Co., of Sugar Creek, Mo., and the Lehigh Cement Co., of Iola, Kan.

"The complaints ask revision of the rates on cement from the Bonner Springs and Sugar Creek territory and from the 'gas belt' of Kansas and Oklahoma, to points in Kansas. The hearing will affect the rate relationship between the Kansas City and gas belt territories and the breaking up of groups of manufacturers in the gas belt district."

Portland Cement Output in July

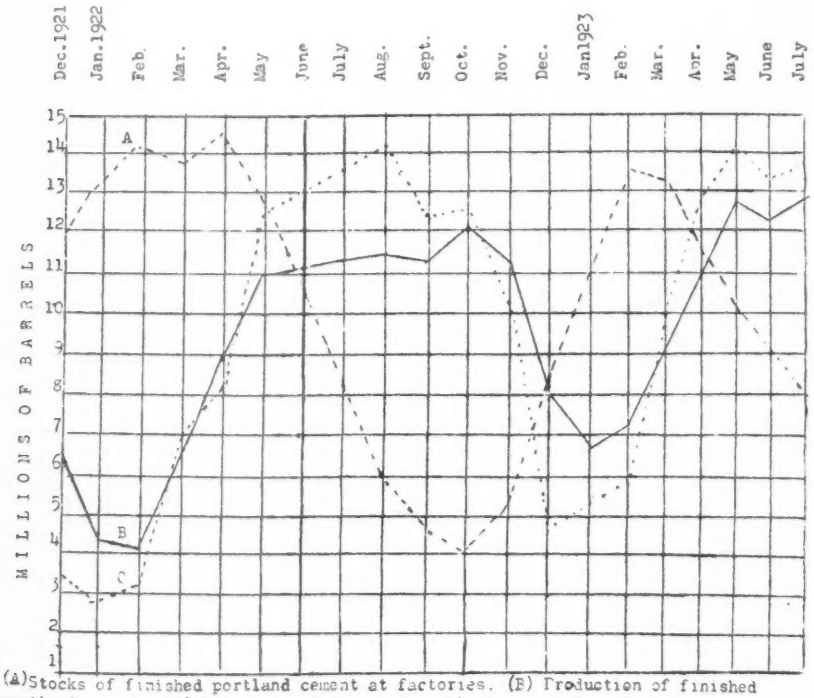
THE statistics shown in the following table issued by the Department of the Interior, an prepared under the direction of Ernest F. Burchard, of the Geological Survey, are based mainly on reports of producers of portland cement but in part on estimates. The estimates for July, 1923, were made necessary by the lack of returns from one producer.

Stocks of clinker, or unground cement, at the mills at the end of July, 1923, amounted to about 3,865,000 bbl. compared with 4,172,000 bbl. (revised) at the beginning of the month.

PRODUCTION, SHIPMENTS AND STOCKS OF FINISHED PORTLAND CEMENT BY DISTRICTS IN JULY, 1922 AND 1923, AND STOCKS IN JUNE, 1923, IN BARRELS

Commercial District	Production—July 1922	Production—July 1923	Shipments—July 1922	Shipments—July 1923	Stocks at end of July 1922*	Stocks at end of July 1923	Stocks at end of June 1923*
Eastern Pa., N. J., Md.	2,842,000	3,216,000	3,551,000	3,484,000	2,457,000	2,814,000	3,082,000
New York	569,000	654,000	662,000	730,000	732,000	655,000	730,000
Ohio, W'n Pa., W. Va.	1,240,000	1,284,000	1,352,000	1,442,000	1,014,000	757,000	915,000
Michigan	722,000	783,000	871,000	895,000	437,000	320,000	433,000
Ill., Ind., Ky.	1,960,000	1,817,000	2,673,000	1,848,000	920,000	497,000	529,000
Va., Tenn., Ala., Ga.	550,000	626,000	565,000	583,000	319,000	234,000	191,000
E'n Mo., Ia., Minn.	1,106,000	1,259,000	1,492,000	1,544,000	851,000	1,014,000	1,299,000
W'n Mo., Neb., Kans., Okla.	843,000	956,000	810,000	1,062,000	841,000	873,000	978,000
Texas	362,000	397,000	424,000	411,000	173,000	187,000	201,000
Colo., Utah	272,000	256,000	274,000	276,000	175,000	159,000	178,000
California	715,000	1,083,000	761,000	1,069,000	235,000	169,000	156,000
Ore., Wash., Mont.	376,000	289,000	415,000	368,000	279,000	397,000	476,000
	11,557,000	12,620,000	13,850,000	13,712,000	8,433,000	8,076,000	9,168,000

*Revised.



(A)Stocks of finished portland cement at factories. (B) Production of finished portland cement. (C) Shipments of finished portland cement from factories.

Cement-Asbestos Slabs

THE New York *Times* of August 5 has a story of a new building material which is made in Johannesburg, S. A. The base is a fibrous asbestos rock which is impregnated with a slow-setting portland cement. The board is built up in layers, the fibers crossing each other until the whole is a homogenous mass of great strength and toughness. The asbestos rock and the cement are both produced locally. A Johannesburg firm has patented a process for reinforcing the slabs made in this way with steel.

Changes in Organization Producing New Lime Hardener "Piercite"

THE Schaffer-Alles Chemical Co., Pittsburgh, Pa., manufacturers of Piercite, the new lime mortar and lime plaster hardener, has become the Alles-Harrison Chemical Co., with A. A. Alles, Jr., president and general manager, succeeding John C. Schaffer, who is now no longer interested in the company.

The personnel of the new organization, besides Mr. Alles, includes L. P. Dillon, of Dillon's Sons, Inc., lime manufacturers, Indian Rock, Va.; James H. McNamara, manager of the Eagle Rock Lime Co., Eagle Rock, Va., vice-president and treasurer; H. H. Pierce, the inventor of Piercite, vice-president; M. L. Kittell, secretary; and D. M. Harrison, chemical engineer. The address of the new company is 119 Fancourt street, Pittsburgh.

Mr. Alles, who was a recent visitor to ROCK PRODUCTS office, said that great progress was being made in the introduction of Piercite-treated lime in the Pittsburgh plaster trade. His company has gone into the lime business to the extent of buying lime by the carload and treating it with Piercite and selling it to Pittsburgh contractors, who are said to be much pleased with the results.

Besides the S.-A. lime hardener, the new company is putting a concrete-waterproofing compound on the job.

Optimism Well Founded Will Win

F. M. PINNEGAR, general sales manager of the Kelley Island Lime and Transport Co., Cleveland, Ohio, writes ROCK PRODUCTS' cousin, the *National Builder*, as follows:

"The building outlook is very good, although considerably eased up over the early months of the year, during which time conditions were abnormal. We believe the industry as a whole, at present, is more stable and will remain so throughout the balance of the year than it has been.

"The lime industry, at present, seems to be enjoying a very healthy condition—about up to standard for this season of the year, and although there is a slight falling off in the demand for this commodity during the extreme hot weather, recent increased activities would indicate that the demand would pretty well equal the supply for some months to come.

"We have made a careful survey of the situation and find it as stated. We believe, however, that the length and extent of present activities would be increased greatly by everyone boosting and at the same time receiving the hearty co-operation of such good publications as your own."

More West Coast Cement Imports

NEWSPAPER reports from Los Angeles and other Pacific Coast cities continue to record the arrival of cargoes of portland cement from Europe. The Los Angeles *Times* stated recently that:

"Approximately 30,000 tons of European cement have arrived here already this season, while a single order was recently placed by a Los Angeles firm for the immediate delivery of 16,000 tons of British cement. Delivery will be made in two consignments.

"The first of these, of 8000 tons, is already en route, having left Middleborough July 25 on the British steamer Mongolian Prince of the Furness Prince Lines. It will be followed within a month by a similar shipment."

Northwest Gypsum Producers in Railway Rate Controversy

PROTESTS against the proposal of the Milwaukee and Great Northern railroads to reduce their rates on gypsum, plaster and plaster products from points in Montana to points west, including Seattle, Tacoma and other North Pacific Coast cities has been taken under advisement by the Interstate Commerce Commission after a hearing in the Chamber of Commerce assembly room conducted by Commissioner Clyde B. Aitchison and attended by representatives of six gysum producing and camnufacturing companies and numerous railroad traffic men and attorneys.

The protest was filed by the Pacific Coast Gypsum Co. of Tacoma and the Western Wallboard Co. of Seattle, which obtained a suspension of the reduced rates several weeks ago pending the investigation the commission completed yesterday. The two companies claimed that the proposed rate reduction, that exceed 10 per cent at some points, would give the Thre Forks Lime Co. of Hanover, Mont., and the Northwest Gypsum Co. of Gypsum, Mont., an unfair trade advantage in common trade territory between the Coast and Idaho.

The protest was joined in at the hearing yesterday by two other companies, the Certainteed Products Co. of Gypsum, Ore., and the Pacific Portland Cement Co., operating a gypsum and plaster plant in Nevada.

The railroad companies defended the proposed lower rates on the ground that they were needd to establish the new gypsum and plaster industry in Montana and also would be advantageous to the railroads in increasing westbound carloadings and helping somewhat to balance the flow of traffic which for many years has been largely eastbound from the coast and has been thrown still further out of balance in the last three years by the loss of long haul westbound business to the intercostal steamship companies.

The railroad men as witnesses pointed out that both railroads are now compelled to haul many empty cars west to load lumber on the coast and need westbound business to reduce the haul on "empties."

S. J. Wettrick, attorney for the Seattle and Tacoma companies, put S. W. McCune, traffic manager of the Tacoma Chamber of Commerce, and other witnesses on the stand to sustain the claim of the protestants that the rates proposed to be reduced were already lower, distance haul considered, to many points than the corresponding rates from the coast cities to the interior and that further reductions would seriously handicap the Seattle and Tacoma manufacturers.

Slate Men Hold Meeting

THE National Slate Association and friends of the slate industry met in an annual outing at Slatington, August 9.

The meeting was held at the Borough Reservoir property and was attended by 135 people. Slate operators were present from Vermont, New York, Virginia, Peach Bottom, including Lehigh and Northampton counties in Pennsylvania. Some of the leaders in other lines of industry throughout the Lehigh Valley took a prominent part in the proceedings.

A short but sober gathering was held, however, before the festivities began, which was presided over by Burgess Peter N. Snyder as chairman. W. S. Hays, of Philadelphia, secretary of the association, read a set of resolutions on the death of Warren G. Harding, copies of which were transmitted to Mrs. Harding and President Calvin Coolidge.

Tentative resolutions on the death of W. H. Keenan were adopted by the industry for presentation at the next association meeting.

Business conditions were discussed by those attending the meeting and it was generally agreed that, through the efforts and influence of the National Slate Association, the slate industry was placed on a more profitable basis.

Governor of Michigan Shakes Big Stick at Cement Manufacturers

A NEWS dispatch from Lansing, Mich., to a Detroit paper, dated August 15, quotes Governor Groesbeck as follows: "I think it is time we got at the bottom of the cement organization in Michigan. When a combine of Michigan business men get together and attempt to gouge their own state government out of a sum so small at $30,000 or $40,000 it is time we put an end to such practices."

It is alleged that: "The state has never been able to secure competitive bids for cement. When it advertised a year ago for 1,000,000 bbl. for this year's supply the manufacturers of the state split the amount desired among themselves and the prices quoted were about the same. The only difference came in added freight charges on delivery.

"Certain concessions were made to the state by the cement interests for this year's supply. A price of 15 cents a barrel under the market price was quoted. Now, however, when it appears that this year's requirements will run from 200,000 to 500,000 bbl. more than originally estimated the additional 15 cents a barrel is demand on all in excess of 1,000,000 bbl."

It probably is not difficult for the *average business man* to understand why cement manufacturers are unwilling to deprive present customers of cement they need in order to sell it to the state at considerable less than the market price in order to make good a blundering estimate of the amount that should have been contracted for in the first place. However, it is a hook to hang political ambitions on. Unfortunately for Governor Groesbeck and his plans, the writer of the news dispatch from which the above excerpts are taken ends his article with uncovering "the nigger in the woodpile" as follows:

"Governor Groesbeck has planned on establishing a state-owned mill, to be operated by prison labor for nearly three years, and now that he has gotten into an open fight with the cement interests he is extending his plans and will soon have estimates on the cost of installing three mills with a combined annual output of about 1,500,000 bbl. a year."

New District Car-Service Bureau

W. J. SMITH is appointed district manager of the car service division of the American Railway Association, with headquarters in Omaha, Neb., effective August 15, 1923.

Mr. Smith will have the authority of the car service division in the following territory:

Nebraska—Entire state.
Wyoming—Entire state.
Colorado—Entire state.
Utah—Entire state.
Idaho—Exclusive of Pan Handle.
Iowa—Terminals at Council Bluffs and Sioux City.

The apportionments of territory assigned in circular of January 11, 1923, which extended jurisdiction of the district manager at St. Louis over the state of Nebraska, of the district manager at Dallas over the state of Colorado, and of the district manager at Chicago over the terminals at Council Bluffs and Sioux City, Iowa, are thus amended accordingly, effective August 15, 1923.

Work Begun on Sweetwater Gypsum Plant

THE Fort Worth (Texas) *Record* says that work has been begun on the $1,000,000 gypsum plant at Sweetwater. The controversy with the city over the laying of a pipe line has been settled. About 400 men will be employed.

Traffic and Transportation

By EDWIN BROOKER, Consulting Transportation and Traffic Expert,
Munsey Building, Washington, D. C.

Proposed Changes in Rates

THE following are the latest proposed changes in freight rates up to the week beginning August 20:

Central Freight Association

6870. Sand and Gravel, James Siding, Pa., to Butler, Pa.; present, sixth class of $2.80 per net ton; proposed, on blast, engine, foundry glass, molding or silica sand, $1.39 per net ton on gravel and other kinds of sand, $1.25 per net ton.

6871. Sand and Gravel, pit of the Mt. Vernon Sand and Gravel Co. to Mt. Vernon, Ohio; present, 70 cents per net ton; proposed, 50 cents per net ton.

6873. Crushed Stone, Kankakee, Lehigh and Van's Siding, Ill., to Syracuse, Milford Junction, Napanee and Bremen, Ind.; present, $1.38 per net ton; proposed, $1.15 per net ton.

6879. Crushed Stone and Crushed Stone Screenings, Bluffton, Ind., to New Haven, Dawkins and Edgerton, Ind.; present, $0.97, $1.04 and $1.04 per net ton respectively; proposed, $0.80 per net ton.

6880. Crushed Stone, Huntington, Ind., to Indiana points:

To	Present Rate Per 100 lb.	Per ton	Proposed Rate, Per net ton
Bunker Hill	$0.11½	$2.30	$0.82
Miami	.13	2.60	.87
Bennetts	.13	2.60	.97
Kokomo	.13	2.60	.97
Atlanta	.14½	2.90	1.07
Arcadia	.14½	2.90	1.07
Cicero	.14½	2.90	1.07
Noblesville	.14½	2.90	1.12
Fishers	.15½	3.10	1.12
Castleton	.15½	3.10	1.13
Indianapolis	.16	3.20	1.13

6882. Sand and Gravel, Peru, Ind., to Indiana.

To	Present Per net ton	Proposed Per net ton
Indianapolis	6th Class	$0.88
Malatt Park	6th Class	.88
Castleton	6th Class	.88
Fishers	6th Class	.88
Noblesville	6th Class	.88
Cicero	6th Class	.85
Arcadia	6th Class	.80
Atlanta	6th Class	.80
Tipton	6th Class	.72
Jacksons	6th Class	.72
Sharpsville	6th Class	.72
Fairfield	6th Class	.72
Kokomo	6th Class	.70
Cassville	6th Class	.70
Bennetts	6th Class	.70
Miami	6th Class	.70
Bunker Hill	6th Class	.70
Doyle	.90	.70
Denver	.90	.70
Deeds	.90	.76
Macy	.90	.76
Wagoners	*.90	.76
Rochester	.90	.76
Tiosa	.90	.76
Walnut	.90	.76
Argos	*.90	.76
Plymouth	6th Class	.76
Tyner	6th Class	.76
Walkerton	6th Class	.76
Kankakee	6th Class	.77
Dillon	6th Class	.77
Stillwell	6th Class	.88
Laporte	6th Class	.88
Belfast	6th Class	.88
Michigan City	6th Class	.88

*Rates from Noblesville, Ind.

6896. Crushed Stone and Crushed Stone Screenings, in bulk, in open cars, Middlepoint, Ohio, to Indiana, per net ton:

To	Present	Proposed
Columbia City	$0.88	$0.80
Arcola	.88	.75
Huntertown	.92	.83
La Otto	.92	.83
Kendallville	.92	.88
Ari	....	.84
Cherubusco	.88	.84
Collins	.88	.84
Hoagland	....	.70

6897. Cement, Universal-New Castle districts, viz.: Bessemer, Chewton, Crescentdale, East New Castle, Kenny Yard, New Castle, Pittsburgh, Universal, Walford and Wampum, Pa., to N. & W. in Virginia and W. Va. Present, as published in individual lines issues. Proposed, to main line stations between Kenova and Roanoke, 22 cents; to branch line stations, rates to be same differential higher than to main line points as applicable on traffic originating at points on and west of the Cleveland-Marietta-Belpre line. The through rates, however, thus arrived at, in no case to exceed combination on Kenova, Ironton, Columbus, etc., observing combination rules as published in Kelley's combination tariff.

6898. Lime, Mosher, Mo., to Midland, Mich., present, via Mo.-Ill. R. R. in connection with C. & E. I., 22½ cents, minimum weight 60,000 lb. Mo.-Ill. Tariff I. C. C. F-59. Proposed, 27½ cents.

6900. Cement, New Castle, Pa., to Sutton, Pa., present, 11 cents; proposed, 12 cents.

6901. Crushed Stone, France Quarries and McVittys, to Gretna, De Graff, Quincy, Pemberton and Sidney, Ohio, present, 60 cents per net ton; proposed, 70 cents per net ton.

6953. Sand and Gravel. Fort Jefferson to Oklahoma and Napoleon, Ohio, present, 16½ cents; proposed, $1 per net ton.

6960. Cement, common, hydraulic, natural or portland, Superior, Ohio, to Beards Fork, Prince Wick and Wacomah, W. Va., present 22 cents to Beards Fork, W. Va., and 29 cents to Prince Wick and Wacomah, W. Va.; proposed, 18½ cents and 21½ cents, respectively.

6976. Sand, Gravel, Slag and Crushed Stone, between points in Illinois Rate Committee territory and from points in C. F. A. territory to points in Illinois Rate Committee territory, present and proposed (illustrations):

From Lehigh (I. C.) to Gilman, Ill. (I. C.), present, 75 cents; proposed 75 cents. From Thornton (I. C.) to Gilman, Ill. (I. C.), present, 88 cents; proposed, 88 cents. From Lehigh (I. C.) to Peoria, Ill. (I. C.), present, 88 cents; proposed, 88 cents. From Green Castle (Big Four) to Champaign, Ill. (Big Four), present, 76 cents; proposed, 88 cents. From Perkins Spur (P. R. R.) to Gilman, Ill. (T. P. & W.), present, 97 cents; proposed, 80 cents.

6988. Lime, from Cold Springs, Ohio, to Pittsburgh, Pa., present, 17 cents; proposed, 13 cents.

6963. Sand and Gravel. Conneaut and Conneaut Harbor, Ohio, and West Springfield, Pa., to Blairsville, Pa., present, $2.52 on blast, engine, foundry, glass, loam or molding sand, and $2.30 per net ton on gravel and other kinds of sand; proposed, $2.27 and $2.05.

Illinois Freight Association

377-G. Lime, carloads, minimum weight, 30,000 lb., 17 cents per 100 lb., from Glencoe, Mo., to points intermediate to Milwaukee, Wis., viz.: Bay View, Beach, Berryville, Carrollville, Chicory Switch, County Line, Cudahy, Ives, Kenosha, Racine, Racine Junction, St. Francis, South Milwaukee, and Winthrop Harbor, Wis., and Zion City, Ill.

1979. Cement, common, natural or portland, carloads, minimum weight, 50,000 lb., except when capacity of car is less, actual capacity of car will govern, but in no case less than 40,000 lb., to establish same commodity rates from Petoskey, Mich., to points in northern Illinois, as currently applicable from Lamson, Mich.

1980. Lime, common, hydrated, quick or slaked, carloads minimum weight, per Official Classification, 25 cents per 100 lb., from Genoa, Marble Head, Rock Ridge, Sandusky and Marion, Ohio, to Mineral, Ill., 28½ cents from Genoa, Marble Head, Martin, Rocky Ridge and Sandusky, to Paducah, Ky., 28½ cents from Genoa, Marble Head and Martin, Ohio, to Madison, Wis., and 28 cents from Woodville, Gibsonburg and Luckey, Ohio, to Louisiana, Mo.

1984. Calcined plaster, land plaster, hard wall plaster, stucco, pulp plaster, hard wall cement, plaster boards, stucco blocks, dried mortar, gypsum rock (ground), plaster of paris, stucco fireproofing and stucco plaster, carloads, minimum weight, 60,000 lb., except on gypsum rock (ground), minimum weight will be 90 per cent of marked capacity of car, except when car is loaded to full cubical or visible capacity, actual weight will govern, but not less than 60,000 lb., 13½ cents per 100 lb., across lake from Grand Rapids, Eagle Mills and Wentworth, Mich., to Cudahy and South Milwaukee, Wis.

1997. Cement, C. L., to establish Peoria basis of rates from Utica, Ottawa, Marseilles and Streator, Ill., to points in Oklahoma, fourth section: Use Rule 77, or apply rates as maxima where necessary between the boundary of Peoria territory and points of origin named.

465E. To cancel arbitraries on sand, gravel, stone and other commodities as named in Notes 3, 4, 5, 6 and 8 of Agent L. A. Kelley's Tariff 20 Series (File 729).

2012. Crushed Stone. C. L., minimum weight 90 per cent of marked capacity of car, from Joliet, Ill., to stations on C. M. & St. P.—e. g., $1.01 to Chicago, Deering, Buena Park; $1.13 to Edgewater, Evanston, etc.; $1.01 to Hermosa, Cragin, Hanson, Park, Bartlette, etc., and $1.26 to Elgin, Ill., etc.

New England Freight Association

4916. Cement, Hudson Upper to Broadalbin, Mayfield, 17 cents; Cranberry Creek, Northville, 18½ cents; Gloversville, 16 cents; Johnstown, N. Y., 14½ cents. Reason—To restore relationship.

5037. Sand, blasting, core, fire or sea, minimum weight 90 per cent marked capacity car, Bellefonte, R. I., to Bush Docks, N. Y., 18 cents; to Elizabethport, Newark and Jersey City, N. J., 18½ cents. Reason: To permit movement of traffic.

5045. Lime, minimum weight 40,000 lb., from Cheshire, Farnams, North Adams, Pittsfield, Renfrew, Richmond, State Line, Zylonite, Mass., to Copertown, Hartwick Seminary, Milford, Phoenix Mills, Portlandville, N. Y., 16 cents. Reason: To apply same basis to C. & C. V. as published to D. & H. Co. mail line, Otego to Binghamton, inclusive.

Southern Freight Association

10656. Cement, C. L., from Spocari, Ala., to Panama City, Fla. Present rate of 16 cents 100 lb. is the result of error made in tariff publication. Proposed rate of 24½ cents per 100 lb. is same as in effect from Birmingham, North Birmingham, Leeds, Ala., Portland, Ga., Ragland, Ala., and Rockmart, Ga.

10684. Gravel, paving or cement, C. L., from Wrens and Frederick to Savannah, Ga. Present rates: From Wrens, via S. & A., 2350 cents per car of 36,000 lb., or 130 cents per net ton; via G. & F., 2500 cents per car 36,000 lb., or 144 cents per net ton; from Frederick, Ga., 2300 cents per car, or 128 cents per net ton. Proposed rate, 117 cents per net ton, same as recently approved from Augusta, Ga.

10692. Slag, C. L., from Cumberland Furnace, Tenn., to Tennessee points named below.

To	Present	Proposed
Memphis	$1.35	$1.13
Jackson	Combn.	1.40
Nashville	4.10	1.08
Clarksville	5.00	.90
Greenbrier	7.70	1.08
Springfield	7.30	1.08

Basis for proposed rates: To Nashville, Tenn., made on basis of the proposed Ga.-Ala. single line scale, in order to meet competition at Newsom, Mims, and other Tennessee points; to Greenbrier and Springfield, same as proposed to Nashville; to Clarksville, made in line with rates on crushed stone from Russellville and Hopkinsville, Ky., to Clarksville; to Memphis, made in line with rate of $1.13 on slag. Goodrich, Tenn., to Memphis, $1.13 on crushed stone from Lytle to Memphis, $1.13 on crushed stone, Newsom to Memphis, and 79 cents on gravel from Camden to Memphis; to Jackson, Tenn., arbitrarily made, taking into consideration rates on crushed stone and slag from and to other points in the same general territory.

10707. Stone, broken or crushed, carload, minimum weight 60,000 lb., from Franklin and Whitehead, to Jackson, Tenn. Present rates from Franklin, $1.69; proposed, $1.32½; from Whitehead, present, $2.38; proposed, $1.55 per ton 2,000 lb. Proposed rates made in line with rates at present in effect from other points in the same general territory for equi-distances.

10708. Sand and Gravel, C. L., from Montgomery to Alabama City, Gadsden, Attalla, Ala., and Chattanooga, Tenn. It is proposed to revise present rates on sand and gravel as follows: To Alabama City, Gadsden and Attalla, Ala., $1.02; to Chattanooga, Tenn., $1.69 per ton 2,000 lb. Proposed rates same as currently in effect from Jacksons Lake, Ala.

10711. Stone, crushed, rubble, or granite sand, carloads minimum weight 60,000 lb., from Granite Hill and Sparta, to Augusta, Ga. Present rate, $0.97 per ton of 2,000 lb. Proposed rate, $0.85 per ton 2,000 lb. Proposed rate is 5 cents per ton less than the rate from Columbia, S. C., to Augusta and compares favorably with

the rates in effect from Park Hill and Columbia, to Augusta, distance considered, and is also in line with rates in effect on the same commodity from and to other southeastern points.

10727. Gravel and Crushed Stone, C. L., minimum weight 30 net tons, from Jacksonville and Florida Transfer, Fla. Present rate, $28.50 per car of 60,000 lb., or $1.90 per net ton. Proposed rate, $1.54 per net ton, based 30 cents per net ton higher than to Tampa, Fla.

10767. Sand and Gravel, straight or mixed carloads, minimum weight 90 per cent of marked capacity of car, except when cars are loaded to their visible capacity, actual weight will govern, from Norris, Ga., to all points in Georgia and South Carolina; also to stations in Florida on and north of a line drawn from Jacksonville to River Junction. At present, lowest combination rates apply. It is proposed to establish rates based on the joint haul mileage scale (less 10 per cent) submitted by carriers to the Georgia Public Service Commission. No change to be made in existing rates where lower than those arrived at by use of the proposed basis.

10778. Cement, C. L., from Fordwick, Va., to A. C. L. stations in South Carolina between Lanes and Charleston, S. C., present rate, 24 cents; proposed rate, 22½ cents per 100 lb., same at present rate from Rockmart, Ga.

10788. Stone, crushed or broken. C. L., from Mascot and Strawberry Plains, Tenn., to stations on Seaboard Air Line in Carolina territory. The present rates as published in So. Ry. I. C. C. A-9649 were arrived at on basis of mileage scale submitted by carries to the Alabama and Georgia Public Service commissions, less 10 per cent, but were erroneously figured on mileages over which the traffic does not move. It is therefore proposed to revise the present rates on basis of the same mileage scale, but via workable routes through Charlotte, N. C.

10795. Sand, carloads, minimum weight stenciled capacity of car, except when cars are loaded to their visible capacity actual weight will govern, from Birmingham, Ala., and Group to points shown below. At present class rates apply. Proposed rates are: To Eastman, $1.71; to Midville, $1.80; to Milan, $1.85; to Montezuma, $1.58; to Buena Vista, $1.44; to Ellaville, $1.49; to Reynolds, $1.49; to Shellman and Macon, $1.58; to Columbus, $1.35; to Americus, $1.53; to Cartersville, $1.31; to Richland, $1.62; to Tifton, $1.81; to Augusta, $1.90; to Dublin, $2.19; to Soperton, $2.25; to Swainsboro, $2.31, and to Louisville, Ga., $2.30 per ton 2000 lb. The above rates, except to Dublin, Soperton, Swainsboro and Louisville, Ga., are on the scales submitted by the carriers to the Alabama and Georgia Public Service commissions for application over trunk lines, reduced 10 per cent, while the rates to Dublin, Soperton, Swainsboro and Louisville are 20 per cent higher than the single line scale submitted for application over trunk lines, plus the joint haul differential.

10824. Sand and Gravel, straight or mixed carloads, minimum weight 90 per cent of marked capacity of car, except when cars are loaded to visible capacity, actual weight, shall govern from Carrollton to Campbellsburg, Turners, English, Eagle, Sanders, Sparta, Glencoe, Elliston, Zion, Verona and Walton, Ky. It is proposed to establish rate of 100 cents per ton 2000 lb. to Walton, Ky., with rates to intermediate stations to be no higher.

10828. Lime, carload, minimum weight 30,000 lb., from Fort Payne, Ala., to Memphis, Tenn., present rate, $3.15 per ton 2000 lb.; proposed rate, $2.70 per ton 2000 lb.; proposed rate is made same as from Chattanooga, Tenn.

10832. Sand, Gravel, Crushed Stone and Slag, C. L., from (a) interstate points to Jacksonville, Fla. (for beyond); (b) from Jacksonville, Fla. (for beyond), to Florida points; (c) from Birmingham district to Florida points. It is proposed (a) where present rates to Jacksonville, Fla., from Interstate shipping points are subject to Agent B. T. Jones' Combination Rules Tariff, I. C. C. U. S. 1, issue rates from such shipping points to Jacksonville, Fla. (for beyond), 12 cents per net ton lower than the present rate, applicable to Jacksonville, Fla. (proper). (b) That the commodity rates published in the Florida Basis Book, Agent Glenn's I. C. C. A363, subject to Agent B. T. Jones' Combination Rules Tariff, I. C. C. No. U. S. 1, be reduced 12 cents per net ton and made not subject to Agent Jones' Combination Rules Tariff. (c) Cancel present commodity rates on slag, C. L., from Alabama and Tennessee points to Florida points, allowing suggested rates on paragraphs (a) and (b) to apply in lieu thereof.

10854. Sand (fertilizer filler), in packages or in bulk, C. L., minimum weight, 60,000 lb., from Brewster, Fla., to various destinations. Present and proposed rates are, in cents per ton 2000 lb.:

To	Present	Proposed
Atlanta, Ga.	$ 3.50	$3.48
Biloxi, Miss.	11.80	4.07
Birmingham, Ala.	10.50	3.84
Charleston, S. C.	3.10	3.26
Columbia, S. C.	6.20	3.35
Eufaula, Ala.	9.80	3.53
Goldsboro, N. C.	9.60	3.93
Gulfport, Miss.	11.80	4.11
Mobile, Ala.	11.00	3.93
New Orleans, La.	11.80	4.25
Savannah, Ga.	3.10	2.90
Wilmington, N. C.	8.50	3.80

The proposed rates are made over Jacksonville, Fla., using to Jacksonville arbitrary proportion of $1.41, which is the same as rate on peat and muck, C. L., from Dundee, Fla., to Jacksonville, for beyond, and beyond Jacksonville, mileage rates on gneiss, ground or pulverized (fertilizer filler).

10876. Lime, C. L., from Concord, Tenn., to East Tennessee points. Present and proposed rates, in cents per net ton:

To	Present	Proposed
Morristown	$1.90	$1.69
Greenville	2.30	1.90
Jonesboro	2.30	1.90
Johnson City	2.30	1.90
Watauga	2.50	1.90
Bristol	2.60	1.90
Newport	2.20	1.69

Basis—To Morristown and Newport, same as in effect to Paint Rock, N. C.; to other points, 20 cents per ton higher than from Knoxville, Tenn.

10877. Gravel (other than washed gravel). C. L., from Spruce Pine, Ala., to Memphis, Tenn. Present rate, $1.13 per net ton; proposed, 90 cents per net ton, made in line with rates from other Southern producing points to Memphis.

10908. Cement, C. L., from Leeds and Ragland, Ala., to Mississippi points named below. Present and proposed rates are (in cents per 100 lb.):

	From Leeds, Ala.		From Ragland, Ala.	
To	Pres.	Prop.	Pres.	Prop.
Box Factory	17	17½	17	17½
Terry	17	17½	17	17½
Smith and Hatcher	17	17½	17	17½
Crystal Springs	17	17½	17½	17½

Proposed rates are the same as in effect from Birmingham and North Birmingham, Ala.

Southwestern Freight Bureau

9040. Crushed Stone. To publish rates on crushed stone, carloads, from Morris Spur and Lone Star Spur, Tex., to Comanche, Duncan and Marlow, Okla., based on the Shreveport-Texas commercial scale. Remarks: It is claimed that the proposed rates are necessary to enable producers at the Texas points named to ship their product to the Oklahoma points referred to in order to take care of a road-building contract.

9097. Crushed Stone. To establish the 9702 scale of rates on crushed stone, minimum weight marked capacity of car, from Tiffin, Texas, to points in Louisiana. Remarks: The proposed rates are claimed necessary to enable shippers engaged in crushing stone at Tiffin, Texas, to move their commodity to Louisiana points.

9137. Crushed or Ground Oyster Shells, etc. To establish rate of 36½ cents per 100 lb. on oyster shells, crushed or ground or not crushed or ground, in bags, barrels, boxes or in bulk, carloads, from Berwick, Houma and Morgan City, La., to St. Paul, Minn., and points taking same rates, as shown in Emerson's Territorial Directory No. 5. Remarks: It is claimed the proposed rate is the same as recently authorized from New Orleans, La., and Mobile, Ala., to St. Paul. Shippers claim they will be unable to meet competition from New Orleans and Mobile unless a parity in rates is maintained.

9204. Sand. To establish rate of 11½ cents per 100 lb. on sand, C. L., minimum weight 80,000 lb., or marked capacity of car if less than 80,000 lb., from New Orleans, La., and points within switching limits thereof taking same rates, to Houston, Texas. Remarks: The 9702 scale for distance of 382 miles, which is the distance from New Orleans to Houston plus 20-mile river transfer produces rate of 11½ cents and shippers ask for application of this rate on commercial sand in lieu of the 12½-cent rate now in effect.

9244. Cement, Plaster and articles grouped therewith. To establish rate of 12½ cents per 100 lb. on cement, plaster and articles grouped therewith, carloads, minimum weight 40,000 lb., from Murfreesboro and Gypsum City, Ark., to Memphis, Tenn., to apply as a proportional rate on business destined Eastern territory. Remarks: The rate suggested in Section 4 is 5 cents per 100 lb. less than the rate published on similar articles in St. L.-S. F. Ry. Tariff 381 Series, from Oklahoma producing points. It is contended that the location of Murfreesboro and Gypsum City justify that figure.

9529. Sand, Gravel, Chatts and Tailings, etc. To establish the following rates in cents per 100 lb. on sand, gravel, chatts and tailings (lead or zinc) carloads, minimum weight marked capacity of car but not less than 60,000 lb. from all points on the N. E. O. to Oklahoma points on M. K. T., Osage division: South Coffeyville to Norfolk, inclusive, 7 cents; Gano to Oklahoma City, inclusive, 8½ cents. Remarks: Proposed rates are now applicable from Joplin district producing points on the St. L.-S. F. and shippers contend that mines on the N. E. O. are entitled to same rate.

5516TX. Cement, portland, C. L., rates on from Harrys and Eagle Ford, Texas, to Cedar Grove, La. Proposition from shippers to establish rate 19 cents per 100 lb. on portland cement, minimum weight 50,000 lb., from Harrys and Eagle Ford, Texas, to Cedar Grove, La. Proposed rate slightly higher than Shreveport, La., rate.

11563. Sand, blast, engine, foundry, glass, molding and silica, C. L. (a), sand, other than blast, engine, foundry, glass, molding and silica, C. L., minimum weight 90 per cent of marked capacity of car except when car is loaded to cubical or visible capacity actual weight will apply; from Raritan River R. R. stations to Portsmouth, Va. (1), $4.30 and (2) $3.52 per 2000 lb.

11564. Sand and Gravel, N. O. I. B. N. in O. C. C. L., minimum weight 90 per cent of marked capacity of car except when car is loaded to cubical or visible capacity actual weight will apply, from Whitings, N. J., to Newark, N. J., $1.20 per 2000 lb.

11571. Cement, common, hydraulic, natural or portland, C. L., minimum weight 50,000 lb., from Portland Point, N. Y., to stations on U. & D. R. R., West Davenport, Edgewood, Tannerville, West Hurley, N. Y., and other points, 19½ to 22 cents per 100 lb.

11579. Cement, C. L., 50,000 lb., Union Bridge, Md., to all points on Morgantown & Kingwood Branch of B. & O., 16 cents per 100 lb.

11583. Crushed Stone, C. L., 90 per cent of marked capacity of car, except when car is loaded to cubical or visible capacity, actual weight will apply, Chapman's Switch, Pa., to Emaus and Macungie, Pa., $1.05 per net ton.

11585. Lime, C. L., 40,000 lb., Knickerbocker, Chickies, Bainbridge, Petersburgh, Pa., Union Bridge, Md., Berkeley, Banker Hill, W. Va., and other points to Maine Central stations Woodford, Me., to Lime Ridge, Quebec, 25 and 27½ cents per 100 lb.

11587. Gravel and Sand, other than blast, engine, foundry, glass, molding, loam or silica, $1.25, and sand, blast, engine, foundry, glass, molding, loam or silica, C. L., $1.35 per 2000 lb., minimum weight 90 per cent of marked capacity or car, except when car is loaded to cubical or visible capacity, actual weight will apply, Star Brick and Struthers, Pa., to all stations on Sheffield & Tionesta Valley.

11588. Sand, other than blast, engine, foundry, loam, molding or silica, C. L., $1.25, and sand, blast, engine, foundry, loam, molding or silica, C. L., $1.35 per 2000 lb. minimum weight 90 per cent of marked capacity of car, except when car is loaded to cubical or visible capacity, actual weight will apply, Garovi, Pa., to Parmers Valley, Pa.

11589. Sand (other than blast, engine, glass, molding, foundry or silica), C. L., minimum weight 90 per cent of marked capacity of car, except when car is loaded to cubical or visible capacity, actual weight will apply, Philadelphia to Nazareth, Pa., $2.30 per 2000 lb.

11591. Slag, in bulk, C. L., minimum weight 90 per cent of marked capacity of car, except when car is loaded to cubical or visible capacity, actual weight will apply, Donaghmore and Lebanon to Middletown and Steelton, Pa., 90 cents per 2000 lb.

11593. Sand (other than blast, engine, foundry, glass, molding and silica) and Gravel, C. L., $1.95, and sand, blast, engine, foundry, glass, molding and silica, C. L., $1.98 per 2000 lb., minimum weight 90 per cent of marked capacity of car, except when car is loaded to cubical or visible capacity, actual weight will apply, Perth Amboy District, N. J., to Kurtztown, Pa.

11594. Sand (other than blast, engine, foundry, glass, molding and silica) and Gravel, C. L., minimum weight 90 per cent of marked capacity of car except when car is loaded to cubical or visible capacity, actual weight will apply, Wysoc to Bernice, Dushore and Lopez, Pa., 90 cents per 2000 lb.

11605. Crushed Stone, C. L., minimum weight 90 per cent of marked capacity of car, except when car is loaded to cubical or visible capacity, actual weight will apply, Vernoy and Califon to Rariton, N. J., 75 cents per net ton.

11606. Asphalt (asphaltum) and Asphalt Cement, C. L., minimum weight O. C. Philadelphia, Chester and Marcus Hook, Pa., to Baltimore, Md., to Virginia Ry. Stations, 27 to 39½ cents per 100 lb. Reasons for above proposals: Rates fairly comparable with others for like distances. Requests for hearing were received up to August 21.

Trunk Line Association

11532. Cement, common, hydraulic, natural, or portland, C. L., minimum weight 50,000 lb., except when for carriers convenience cars of less capacity are furnished, in which case the minimum weight will be the marked capacity of car furnished, but in no case less than 40,000 lb., from stations on L. & N. E., and Northampton & Bath, to stations on N. & W., J. W. Rogers,

Va., to New Bohemia, Va.; P. & A. junction to B. E. Cobb, Va., 25 cents per 100 lb.

11533. Lime, C. L., minimum weight O. C., Dover Plains, N. Y., to stations on Fonda, Johnstown & Gloversville, Johnstown, Gloversville, Broadalbin, Mayfield, and Cranberry Creek, N. Y., 19½ cents to 23½ cents per 100 lb.

11555. Cement, common, hydraulic, natural or Portland, C. L., minimum weight 50,000 lb., except when for carriers' convenience cars of less capacity are furnished, in which case minimum weight will be the marked capacity of car furnished but in no case less than 40,000 lb., from Union Bridge, Md., to Stewartstown stations, 10½ cents per 100 lb.

Western Trunk Line Association

3294. Lime, C. L., from Manistique, Mich., and lime producing points in Wisconsin, to C. F. A. points. Present and proposed, Manistique, Mich., via Hamilton, Wis., to a few representative points:

From Manistique to Detroit, Grand Rapids, Lansing and Saginaw, Mich., present, 17 cents; proposed, 17 cents.

From Hamilton, Wis., to Detroit, Grand Rapids, Lansing and Saginaw, Mich., present, 16 cents; proposed, 17 cents.

403-C. Lime, C. L., from Cedarburg, Elkhart Lake, Grafton, Hayton, Knowles, Mayville, Brillion, Sherwood, Eden and Grimms, Wis.

	Present	Proposed
Chicago	$0.11	$0.10
Elgin	.13	.11½
Rockford	.13	.11½
Freeport	.13	.11½
Elmhurst	.13	.11½
St. Charles	.13	.11½
Aurora	.13	.11½
Evanston	.11	.10
Waukegan	.11	.10

Minimum weight 30,000 lb.

3329. Crushed Stone, C. L., from Waukegan, Ill., to Colorado common points, present, 61 cents; proposed, 38 cents. Minimum weight, 90 per cent of marked capacity of car, except that when weight of shipment loaded to full visible capacity of car is less than 90 per cent of marked capacity of car, actual weight will apply. In no case shall the minimum weight be less than 40,000 lb.

Notices of Withdrawal

Refer to Docket Bulletin No. 651, dated March 24, 1923, Docket 3045, also Docket Bulletin No. 703, dated June 1, 1923, Amendment No. 1 to Docket 3045, covering "cement, hydraulic, portland or natural, C. L., from Hannibal, Mo., to various points in Nebraska." This subject is hereby withdrawn from the docket.

Refer to Docket Bulletin No. 651, dated March 24, 1923, Docket No. 3045-A, covering "cement, hydraulic, portland or natural, C. L., from Hannibal, Mo., to various Nebraska points, also Padonia, Kansas." This subject is hereby withdrawn from the docket.

Trade Association Activities That Help

DECLARING that the trade association as a facility for the promotion and self-regulation of industry and commerce has become, by reason of its scope and activity, an important American business institution, with which the public, generally speaking, is little acquainted, Herbert Hoover, Secretary of Commerce, in the introduction to that department's new book entitled "Trade Association Activities" released July 16, expressed the opinion that the constructive purposes of these organizations have unfortunately been confused with the minority of activities which have been used as a cloak for action against public interest. According to Secretary Hoover:

"All trade association activities are not good, just as all individual habits are not good until so proved by their reactions on the individual and the community. Perhaps the best way to guide activities into the most constructive and profitable channels is through thoroughgoing analysis and examination of those activities which seem on the surface to be constructive in their application and results."

On the subject of statistics, Secretary Hoover says: "There is no question but that the curves in the business cycle from activity to depression have been less disastrous in those industries or trades where accurate, lawful statistical data have been available to all. Fundamentally, it is impossible for business men to form those vital judgments as to their future course of action in the wise and safe direction of their activities unless they are informed as to the changing currents of production and consumption, not only in their own lines but also in other lines of business, which indicate broader currents of economic life. The only criteria are statistics, and if industry is to march with reasonable profits instead of undergoing fits of famine and feast; if employment is to be held constant and not subjected to vast waves of hardship, there must be adequate statistical service. Whether these services are to be maintained by the government or by trade associations, they must be maintained if we are to have an orderly economic life."

Discussing legislative activities, Mr. Hoover asserts that, "The interest of any one industry or trade, to be sound in the ultimate analysis, must be the public interest and in their legislative activities many trade associations have borne this axiom foremost. The demand of legislatures for the views of the different trades upon all sorts of questions of public interest is incessant, and the open preparation and presentation of such matters is far more consonant with proper development of public life than the private lobbying of the few or powerful.

Waste elimination, in a vast area of problems, can only be accomplished by collective action in a trade. Hundreds of millions of dollars have been saved through the adoption of principles laid down in such programs, not alone to the business groups concerned but to the ultimate consumer. They have brought about lower prices, through attacking directly the costs of raw material, inefficient plant operation, and unnecessary stock maintenance.

With reference to cost accounting activities, Secretary Hoover pointed to the "truly remarkable findings of government agencies in the war years regarding the knowledge and understanding of costs in production and distribution. Losses often were confused with profits, those investigations showed, all for the lack of knowledge of the fundamentals of cost accounting. Today, the trade association is proving itself the most potent organized influence in the study of costs in industry and trade, aiming toward standard systems applicable to peculiar conditions. All of which tend to more scientific knowledge of business and lowered costs."

On the subject of employe relations, the secretary indicates, that while at earlier periods the individual business concern or manager, perhaps, has taken more frequently the initiative in forward policies of such relations, trade association after trade association is now developing the necessary preliminary stages of more equitable and advanced phases of this subject. In most cases it is largely a matter of research into the tremendous problems involved—selection of personnel, education, welfare work, accident prevention, employment principles, and collective agreements.

In the opinion of Mr. Hoover, the associations will recognize that in the years of devotion to improving the processes of production and distribution there has been great oversight of the human factor and its mass relation. "Shall it be approached blindly and without preparation and knowledge?" the secretary asks, answering, "Not if the present-day indications of trade association activity have real meaning."

Credit and collection activities, trade disputes and ethics, insurance, public relations, traffic and transportation, commercial research, industrial research and government relations are among the other subjects discussed by Secretary Hoover in the introduction to the book, a volume of 368 pages, sold by the Superintendent of Documents, Government Printing Office, Washington, D. C., and by the field offices of the Department of Commerce at 50 cents a copy.

Chemical Exposition to Be Held Biennially

THE Chemical Exposition will not be held in 1924, according to a recent vote taken among the exhibitors by the management. The results of a mail vote on the question of whether the exposition should be held every year or every other year ended on July 28 and showed about 60 per cent of exhibitors voting were in favor of a biennial exposition. The vote by mail was taken by the management as a result of the meeting of exhibitors held at the Chemists' Club, New York, on July 28, at which time a vote on the question by those present resulted in a tie. It was then decided that all exhibitors should vote again by mail and that this should be considered the final decision in the matter. Following the 1923 Chemical Exposition, which will be held during the week of September 17 to 22 at the Grand Central Palace, New York, the next exposition will be held in 1925.

New Machinery and Equipment

New ¾-Yd. Gasoline Shovel

A NEW ¾-yd. gasoline rope-thrust revolving shovel, known as the 20-B, has just been announced by the Bucyrus Co., South Milwaukee, Wis. This shovel contains the same unique features which are embodied in their 30-B gasoline machine which has been on the market for the past year.

Gasoline shovel with ¾-yd. dipper

The feature which makes this machine unique among shovels of this type, says the company, is the ingenious rope-thrust arrangement which not only does away with the necessity of engines, gears, clutches, chains or complicated shafting on the boom, but at the same time gives this shovel a drive behind the thrust more powerful than it is possible to obtain with a steam shovel of the same size, since the whole power of the main engine is behind it.

This device has proved itself on the 30-B shovel under the toughest digging conditions in all parts of the world, and its manufacturers believe that it has literally created in itself a new era for the small shovel, driven by an internal combustion engine.

Briefly stated, the shovel is driven by a single, rugged, slow-speed gasoline engine. The motions of the dipper handle are controlled by a small drum on a shaft under the boom, which shaft has keyed to it pinions for engaging with the racks on the handle. The drum is turned either way by two ropes wound around this drum in opposite directions, both ropes leading to drums in the main machinery.

The striking fact about the performance of this shovel is the ease with which the operator can control the motions of the dipper, even to shake it to relieve it of sticky material.

This shovel may also be had with high lift or extra high lift booms, or with dragline, clamshell excavator or crane attachments.

The control is exceedingly simple, and the machinery arranged with convenience of the operator in mind. Whatever clutches are necessary are sufficiently large to obviate the danger of burning. The caterpillars and frame in general are of unusual strength and ruggedness.

One-Man Portable Gasoline Hammer Drill

A GASOLINE impact drill of the air hammer type is manufactured by the Pennsylvania Gasoline Drill Co., Land Title building, Philadelphia, Pa. It has a self-contained gasoline engine making its own power, therefore no other power equipment has to be transported with it. The complete unit weighs about 70 lb.

It is particularly adapted to such work as cutting asphalt, breaking concrete bases, picking frozen earth and tamping back fill. Its mechanical principle combines the action of an air hammer and a gasoline engine in such manner that the drilling unit has but two moving parts, the hammer piston and the flywheel assembly. No crankshaft or connecting rod is employed and there is no spring or other yielding member used in the internal construction. No inlet or exhaust valves or cam shafts are used, as the air and gas passages are fixed ports, cut through the solid steel of the cylinder.

The down or power strokes of the hammer piston, it is claimed, are made with approximately 900 lb. of gasoline explosive force thrusting it forward to hit the drill bit with terrific force; the flywheel is employed only to return the hammer piston on the upward or compression strokes; approximately 1800 impacts are struck each minute.

For carburation, a gasoline mixing valve is used which permits the drill to be worked at any angle. While the drill continues to run at full speed, the operator shifts it from one position to another and to any desired angle without affecting its operation. To start the drill, the operator gives the flywheel rim a pull by hand, and even in the coldest weather, it is claimed, the engine starts "with consistent regularity" and certainty.

Lubrication of all parts of the drill is by means of scoops, fixed to the hub of the flywheel, which in turn runs in a reservoir of oil and delivers a coupious supply to all moving parts. A pint of oil is said to lubricate the drill for a week. A four or six dry cell battery is used for ignition.

Complete gasoline driven drilling unit in operation

A New Non-Freezing Explosive

AMMITE, say the manufacturers, the Atlas Powder Co., Wilmington, Del., is an explosive that retains all the advantages of dynamite in strength, velocity, water-resistance, sensitiveness and stability combined with the additional advantages of being non-freezing and of not causing headaches when handled.

Ammite is graded, it is said, as to its percentage strength in the same manner that the various forms of dynamite are graded. It is made in six grades—75, 60, 50, 40, 35 and 30 per cent—sufficient to meet practically every requirement encountered in any kind of blasting, either above or below ground.

Quarried from Life

By Liman Sandrock

Calvin Arthur Campbell

IT takes wèlnigh a page of the *Century Dictionary* to record the achievements of the high lights of the Scottish clan Campbell, beginning with Alexander, the founder of the Campbellites and having the luck to be born in Ireland; the noble dukes, statesmen, and scholars of that ilk—and winding up with Rob Roy! We dinna fash oursel' wi' the clavers of the historians as to Rob, for Walter Scott's tales of him suit us down to the ground even if they are more or less romance.

Permit us to add another Campbell to history's proud pages by calling to your attention some of the interesting facts in the life of Calvin Arthur Campbell, president and general manager of the Campbell Stone Co. of Indian River, Mich.

Brother Campbell was born in Canada, of Scotch parentage. A little Scotch is a braw thing, whichever way you take it, and when one can boast of being Scotch "on both sides," it's something to brag about!

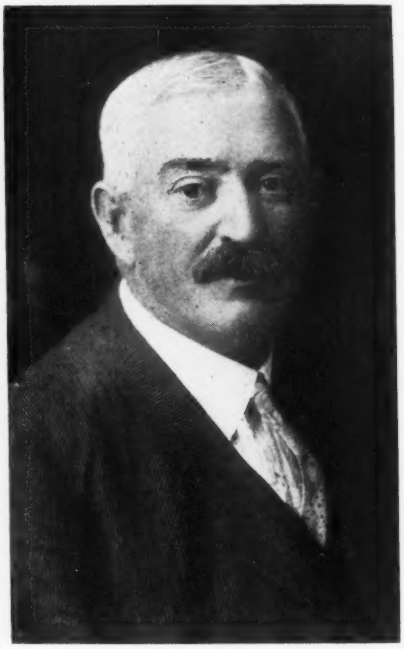
Young Campbell crossed the border at the age of 12 and settled in Bay City. When he was 16—an age when the most of us feel that we've acquired all the schools have to offer—he got a job as a brakeman on the Michigan Central. It took him only four years in which to become the youngest conductor that railroad ever had. An enviable record.

Undoubtedly, railroading has fitted many of our industry with a training that could not well be gotten elsewhere—perhaps taken away any desire to cultivate a single-track mind; to be sidetracked from the main line of endeavor, or to be shunted into the tall timbers. There's J. J. Sullivan, of Dolese & Shepard; F. M. Pinnegar, of the Kelley Island, who was also a Michigan Central graduate; Edwin Brooker, our transportation and traffic expert, to quote a few instances.

We are confident that Mr. Campbell was an ideal conductor—helping all the old ladies off the steps; having a smile for the daily commuters, a cheery word for his associates, and a keen eye for the company's best interests. He was an M. C. conductor for the following 25 years. Then, says our Joe Costello—who acted as a sort of Boswell in the compilation of this history—Mr. Campbell "found his true bent." Of course, this was when he entered the stone business, in 1906.

Along about the spring of 1911 Mr. Campbell started to burn lime, after visiting the plant of the New York Lime Co., at Carthage, N. Y. On his return he installed a rotary kiln. The plant was first operated with a gas producer, but in 1917 Mr. Campbell changed to pulverized coal; in 1919 he installed a steam jet.

We have saved Indian River as a peg on which to hang some of Mr. Campbell's achievements outside of his business. In



C. A. Campbell, president the Campbell Stone Co.

that town he looms large as a sterling Republican, a prominent and honored citizen and one of the main supports of Indian River's best institutions. He has also served as treasurer of his town's school board.

Then, too, he is an ardent golfer in his moments of recreation, as is proper for a Campbell to be. You must know that the ancient and classic game of golf had its first home in the Land o' Cakes, where its best minds have sought surcease from the cares of state, of science and of literature. Right here we will wager that Mr. Campbell's game is a near approach to par—it should be by inheritance, shouldn't it?

He has one son, Calvin Arthur, Jr., who is a student at the University of Michigan, where he is fitting himself with all the scholastic and social honors that go with chemical engineering to take a place in his father's business. Our Joe Boswell Costello also tells us that he paid a visit to Park Tavern, a local summer hotel owned by Mr. Campbell, where he found relaxation from his labors at Indian River. (Now, don't get us wrong in our use of "relaxation" in conjunction with the Tavern—we mean that Joe swam, fished, basked in the sunshine and dreamed of new things to accomplish in the way of doing his stent as a member of the Rock Products business family.)

Gravel's a Small Thing at the Pit, but—

DOWN in Kerrville, Tenn., according to the Memphis *Commercial-Appeal*, the county fellers are graveling a road that passes Squire Aycock's place. A good-sized number of irate citizens are a-gritting their teeth because some of their gravel has sort of filtered over from the king's highway into Squire's private driveway, hints the *Appeal*.

Anyhow, the Squire has riz' up and plum denied that he got the gravel. Fact is, Roy Cash and Jim Parr, two of the petitioners, haled Squire to the indignation meeting and all three on 'em dum nigh come to blows, by tunket!

Latest accounts say that Squire is still loud in his denial that he got the aforesaid gravel, but the county officials have charged up the gravel to the foreman of the crew that dumped the stuff—and there you are!

All of which seems to prove that a load of gravel may be a small thing at the pit, but it sure looms large on a private driveway in the eyes of the taxpayer.

A facetious reader sends us this one: "If you knock the 'l' out of gravel, you'll have nothing left but a grave." We will bury this joke right here.

What They Think of Us in Russia!

We can't well believe that Russia is all bolshiviki, leninovich or trotski, else why should a Moscow journal print the following lines on Rock Products?

If any reader desires to take issue with the sentiments expressed therein, we will be glad to give him the space to do so—on this page.

20. Rock Products. Двухнедельн. Выпуски от 4 до 14 листов in 4º. Чикаго, Соед. Штаты. Большой интересный журнал обычного типа американских технических изданий, всесторонне освещающий добычу строительных материалов—камня, песка, гравия глины, цементных материалов, полевого шпата, талька, фосфатов, гипса и др., производство цемента, кирпичей и проч. Большое внимание уделяется механизации добычи, богатая хроника, цены, вопросы транспорта.

Editorial Comment

The Phoenix Cement Plant

The new Birmingham plant of the Phoenix Portland Cement Co. is possibly the most notable recent addition to this country's splendid group of up-to-the-minute portland-cement mills. It is notable for at least three outstanding features—the selection of the dry process, the record of speed of construction, and the unusual arrangement of the raw material storage. Probably the most important of these to American cement manufacturers is the selection of the dry process of manufacture and the reasons for it. This feature, with the assistance of President Morton, we have tried to cover in considerable detail in the article elsewhere in this issue. Also particular attention is called to the economy of the grinding plant, where the same mills are used for both raw material and clinker grinding.

Let Us Have Costs!

There is something of a revival of the movement for state and county ownership of sand and gravel pits and crushed-stone plants at the present moment. So long as voters are voters and politicians are politicians we shall probably have these revivals, as such enterprises are fine bait with which to angle for votes. Regardless of what he knows of the increased cost of labor and of the other factors of production in his own business, the average voter continues to think of old times when he could back his cart into a sand pit and pay ten cents a yard to the owner and shovel it on himself. Even after it has been explained to him that washed sand and gravel and crushed stone are manufactured products today, and that they have to be made to fill pretty rigid specifications, with a considerable waste in the process and the use of expensive labor and machinery to bring up the cost, he still feels that there is a catch somewhere, and that the producer must be getting very rich, even though it does not show in his manner of living nor even in his income tax returns.

Rock Products can offer no valid objection to a state, a county or any other organization going into any industry if it can conduct such an industry fairly and really make money for the people. But there is all the evidence in the world to show that no such enterprise is ever conducted on a business basis, or in such a way that the taxpayers and the people as a whole benefit from it. In every case where state or county has conducted an enterprise of the sort we are discussing an absolute loss has been shown, or the cost figures have been so camouflaged that no fair comparison could be made. In one case of which the writer knows the state plant managed to make a fair showing as to cost, but the material produced was away below the specifications which the state itself had made. And this is a fair example of the way operation results are juggled to make the taxpayer think that he is getting some returns on a heavy investment.

The remedy does not lie in propaganda and railing against politicians, but in compelling costs to be kept in such a way that a fair comparison can be made between contract price and day labor methods. California has recently passed a law which will compel accurate cost accounting on all construction work at least. All persons proposing to perform day labor for the state must file accurate plans and specifications, record the names of all bidders and the amounts bid on the same work and all changes from the plans and specifications on file. This will show how much the work cost as compared with what contractors were willing to do it for. If such a method can be applied to construction work, it can certainly be applied to the cost of producing road materials and the like, and the existence of such a law would cause the most sanguine of politicians to hesitate before he advocated letting the state or county in for a heavy plant investment that would be bound to show a loss to the taxpayers as soon as the results were made public.

Coon River Gravel Plant

Randolph Snoddy is well known to sand and gravel producers, especially those of the National Association, for his innovations in plant design and operation. His ideas are somewhat different from some other people's radical notions in that they seem to work. A good example is found in the description of his latest plant in this issue. It is noticeable that he has changed the usual course of the material through the flow sheet, which is to bring everything to the highest point in the plant and then allow it to fall through the screens and separators to the bins.

Mr. Snoddy carries his material through a series of slight elevations and makes a final lift of the finished product to get it into the bins. His plant belt conveyor is only 56 ft. long instead of the usual 180 to 200 ft. By elevating only the finished products, he can use an elevator of comparatively small size and he saves handling a lot of excess weight in waste material and water. The low-plant design not only keeps down the elevating cost but also the cost of structures.

Another good point about the plant is the way that he has bypassed the gravel-road material at the proper points. While it is true that this design will not meet conditions everywhere, it is worth studying by any one who is interested in sand and gravel plant design.

The Rock Products Market

Wholesale Prices of Crushed Stone

Prices given are per ton, F. O. B., at producing plant or nearest shipping point

Crushed Limestone

City or shipping point	Screenings, ¼ inch down	½ inch and less	¾ inch and less	1½ inch and less	2½ inch and less	3 inch and larger
EASTERN:						
Blakeslee, N. Y.	1.00	1.25	1.10	1.10	1.10	.....
Buffalo, N. Y.			1.30 per net ton all sizes			
Chaumont, N. Y.	1.00	.....	1.75	1.50	1.50	1.50
Cobleskill, N. Y.	1.25	1.25	1.25	1.25	1.25	.....
Coldwater, N. Y.			1.50 per net ton all sizes			
Eastern Pennsylvania	1.35	1.35	1.45	1.35	1.35	1.35
Munns, N. Y.	1.00	1.40	1.40	1.30	1.30	.....
Prospect, N. Y.	.80	1.40	1.40	1.30	1.30	.....
Walford, Pa.	1.55	1.55	1.55	1.55	1.55	1.55
Watertown, N. Y.	1.00	.....	1.75	1.50	1.50	1.50
Western New York	.85	1.25	1.25	1.25	1.25	1.25
CENTRAL:						
Alton, Ill.	1.50@2.00	.....	1.50	.....	.....	.....
Buffalo, Iowa	.70	.....	1.35	1.15	1.20	1.20
Bloomville, Middlepoint, Dunkirk, Bellevue, Ohio	1.00	1.10	1.10	1.00	1.00	1.00
Chasco, Ill.	1.35	1.35	1.35	1.35	1.35	1.00
Chicago, Ill.	.80	1.50	1.10	1.10	1.10	1.10
Dundas, Ont.	.95	1.35	1.35	1.35	1.10	1.10
Greencastle, Ind.	1.25	1.15	1.05	.95	.95	.95
Krause, Columbia and Valmeyer, Ill.	1.20	1.20	1.35	1.35	1.20	1.20
Lannon, Wis.	.80	1.10	1.10	1.00	1.00	.90
Mitchell, Ind.	1.00	1.00	1.00	1.00	1.00	1.00
Montreal, Canada	.90	1.20	1.10	1.00	.95	.95
Montrose, Iowa	.....	1.50	1.60	1.55	1.45	1.40
Sheboygan, Wis.	1.05@1.10	1.05@1.10	1.05@1.10	1.05@1.10	1.05@1.10	1.05@1.10
Southern Illinois	1.35	1.35	1.35	1.35	1.35	1.00
Stolle, Ill. (I. C. R. R.)	1.30	.....	1.35	1.35	1.35	1.35
Stone City, Ia.	.75	.....	1.50	1.40	1.30	.....
Toledo, Ohio	1.60	1.70	1.70	1.70	1.60	1.60
Toronto, Canada	1.90	2.25	1.00	1.00	1.00	1.00
			Prices include 90c freight			
Waukesha, Wis.	1.00	1.00	1.00	1.00	1.00	1.00
SOUTHERN:						
Alderson, W. Va.	.75	1.25	1.40	1.25	1.15	.....
Bridgeport, Texas	1.10	1.40	1.35	1.35	1.25	1.25
Bromide, Okla.	.75	2.00	1.75	1.60	1.50	1.25
Cartersville, Ga.	1.25	1.60	1.60	1.00	1.20	1.15
Chickamauga, Tenn.	1.00	1.00@1.25	.....	1.00@1.25	1.00@1.25	.....
El Paso, Texas	1.00	1.00	1.00	1.00	.....	.....
Ft. Springs, W. Va.	.80	1.60	1.60	1.50	1.40	.....
Garnet and Tulsa, Okla.	.50	1.60	1.60	1.45	1.45	.....
Ladds, Ga.	.....	.....	1.40	1.40	1.40	.....
Morris Spur (near Ft. Worth), Tex.	1.10	1.35	1.30	1.25	1.25	1.20
WESTERN:						
Atchison, Kans.	.50	2.00	2.00	2.00	2.00	1.90
Blue Spr'gs and Wymore, Neb.	.20	1.40	1.40	1.35	1.25	1.20
Cape Girardeau, Mo.	1.35	.....	1 10	1.35	1.10	.....
Kansas City, Mo.	1.00	1.50	1.50	1.50	1.50	1.50

Crushed Trap Rock

City or shipping point	Screenings, ¼ inch down	½ inch and less	¾ inch and less	1½ inch and less	2½ inch and less	3 inch and larger
Branford, Conn.	.60	1.50	1.35	1.15	1.00	.....
Bound Brook, N. J.	1.70	2.10	1.80	1.50	1.40	.....
Dresser Jct., Wis.	1.00	2.25	.....	1.75	2.00	.....
Duluth, Minn.	1.00	2.25	2.00	1.50	1.40	.....
E. Summit, N. J.	1.80	2.30	1.90	1.60	1.40	.....
Eastern Massachusetts	.85	1.75	1.75	1.40	1.40	1.40
Eastern New York	.75	1.50	1.50	1.30	1.40	1.30
Eastern Pennsylvania	1.25	1.55	1.50	1.40	1.40	1.40
New Britain, Middlefield, Rocky Hill, Meriden, Conn.	.60	1.50@2.00	1.35@1.50	1.15@1.25	1.00@1.10	.....
Oakland, Calif.	1.75	1.75	1.75	1.75	1.75	.....
Richmond, Calif.	.50*	.....	1.50*	1.50*	1.50*	.....
San Diego, Calif.	1.80	1.80	1.50@1.80	1.25@1.55	1.25@1.55	1.10@1.35
Spring Valley, Calif.	.70	1.55	1.50	1.40	1.35	1.35
Springfield, N. J.	2.00	2.20	2.10	1.70	1.70	1.40
Westfield, Mass.	.60	1.50	1.35	1.20	1.10	.....

Miscellaneous Crushed Stone

City or shipping point	Screenings, ¼ inch down	½ inch and less	¾ inch and less	1½ inch and less	2½ inch and less	3 inch and larger
Atlanta, Ga.—Granite	1.47	2.07	2.07	1.97	1.97	.....
Buffalo, N. Y.—Granite	.90	.....	1.20	1.00	1.05	1.10
Berlin, Utley and Red Granite, Wis.	1.60	1.70	1.60	1.50	1.40	.....
Columbia, S. C.—Granite	.50	2.25	2.25	2.00	2.00	2.00
Eastern Penna.—Sandstone	.85	1.60	1.55	1.35	1.35	1.30
Eastern Penna.—Quartzite	1.20	1.35	1.20	1.20	1.20	1.20
Lithonia, Ga.—Granite	.75	1.75	1.75	1.25	1.25	.....
Lohrville, Wis.—Cr. Granite	1.35	1.40	1.30	.....	1.20	.....
Middlebrook, Mo.—Granite	3.00@3.50	.....	2.00@2.25	2.00@2.25	.....	1.25@1.50
Sioux Falls, S. D.—Granite	1.00	1.60	1.55	.....	1.50	.....

*Cubic yard. †Agrl. lime. ‖R.R. ballast. §Flux. ‡Rip-rap, a 3-inch and less.

Agricultural Limestone

(Pulverized)

Chaumont, N. Y. — Analysis, 95% $CaCO_3$, 1.14% $MgCO_3$ — Thru 100 mesh; sacks, 4.00; bulk	2.50
Grove City, Pa. — Analysis, 94.89% $CaCO_3$, 1.50% $MgCO_3$; 60% thru 100 mesh; 45% thru 200 mesh; 100% thru 20 mesh; sacks, 5.00	3.50
Hillsville, Pa.—Analysis, 94% $CaCO_3$, 1.40% $MgCO_3$, 75% thru 100 mesh; sacks, 5.00, bulk	3.50
Jamesville, N. Y. — Analysis, 89.25% $CaCO_3$; 5.25% $MgCO_3$; pulverized, bags, 4.00; bulk	2.50
New Castle, Pa.—96% $CaCO_3$ 1.40% $MgCO_3$—75% thru 100 mesh, 94% thru 50 mesh; sacks, 5.00; bulk	3.50
Walford, Pa.—Analysis, 50% thru 100 mesh; 4.50 in paper; bulk	3.00
Watertown, N. Y. — Analysis, 96% **$CaCO_3$; .02% $MgCO_3$; 90%** thru 100 mesh; bulk, 3.00; sacks	4.50
West Stockbridge, Mass., Danbury, Conn., North Pownal, Vt.—Analysis, 90% $CaCO_3$ — 50% thru 100 mesh; paper bags, 4.75—cloth, 5.25; bulk	3.25
Alton, Ill. — Analysis, 98% $CaCO_3$, 0.5% $MgCO_3$; 90% thru 100 mesh	6.00
Belleville, Ont. — Analysis, 90.9% $CaCO_3$, 1.15% $MgCO_3$—45% to 50% thru 100 mesh, 61% to 70% thru 50 mesh; bulk	2.50
Chasco, Ill.—Analysis, 96.12% $CaCO_3$, 2.5% $MgCO_3$; 90% thru 100 mesh.	5.00
90% thru 50 mesh	1.35
Detroit, Mich.—Analysis, 88% $CaCO_3$, 7% $MgCO_3$—75% thru 200 mesh, 2.50@4.75—60% thru 100 mesh	1.80@3.80
Marblehead, Ohio — Analysis, 83.54% $CaCO_3$, 14.92% $MgCO_3$; 60% thru 100 mesh; 80-lb p. sacks 5.00; bulk	3.50
Piqua, Ohio—100% thru 10 mesh, 2.10; 50% thru 100 mesh, 2.25; 80% thru 100 mesh, 5.00; 100% thru 100 mesh; bags 7.00; bulk	5.50
Waukesha, Wis.—Analysis, neutralizing equivalent 107.38% $CaCO_3$; 99% thru 10 mesh, 55% thru 60 mesh; bulk	2.35
200-mesh bags ex., returnable	4.50
Cape Girardeau, Mo. — Analysis, 93% $CaCO_3$, 3.5% $MgCO_3$; 10% thru 10 mesh	1.50
Hot Springs, N. C.—50% thru 100 mesh; sacks, 4.25; bulk	2.70
Knoxville, Tenn.—80% thru 100 mesh, bulk (bags 1.25 extra)	2.70
Linville Falls, N. C.—Analysis, 57% $CaCO_3$, 39% $MgCO_3$; 50% thru 100 mesh; bulk	2.75
Mountville, Va. — Analysis, 76.60% $CaCO_3$, 22.83% $MgCO_3$—50% thru 100 mesh; 100% thru 20 mesh; sacks	5.00
Colton Calif.—Analysis, 95% $CaCO_3$, 3% $MgCO_3$—all thru 20 mesh—bulk	4.00
Lemon Cove, Calif.—Analysis, 94.8% $CaCO_3$, 0.42% $MgCO_3$; 60% thru 200 mesh; sacks, 5.25; bulk	4.50

Agricultural Limestone

(Crushed)

Alton, Ill. — Analysis, 98% $CaCO_3$, 0.1% $MgCO_3$; 90% thru 50 mesh	1.50
Bellevue, Ohio — Analysis, 61.56% $CaCO_3$, 36.24% $MgCO_3$; ¼ in. to dust, about 20% thru 100 mesh	1.25
Bettendorf, Iowa, and Moline, Ill.—97% $CaCO_3$, 2% $MgCO_3$; 50% thru 100 mesh; 50% thru 4 mesh	1.50
Buffalo, Iowa—90% thru 4 mesh	1.00
Cape Girardeau, Mo.—Analysis, 93% $CaCO_3$, 3.5% $MgCO_3$; 100% thru 10 mesh, 90% thru 50 mesh	1.50
90% thru 4 mesh, cu. yd	1.35
Chicago, Ill.—Analysis, 53.63% $CaCO_3$, 37.51% $MgCO_3$; 90% thru 4 mesh	.80
Columbia, Ill., near East St. Louis—½-in. down	1.25@ 1.80
Elmhurst, Ill.—Analysis, 35.73% $CaCO_3$, 20.69% $MgCO_3$; 50% thru 50 mesh	1.25
Huntington and Bluffton, Ind.—Analysis, 61.56% $CaCO_3$, 36.24% $MgCO_3$; about 20% thru 100 mesh	1.25

(Continued on next page)

Agricultural Limestone

(Continued from preceding page)

Greencastle, Indiana.—Analysis, 98% $CaCO_3$; 50% thru 50 mesh..... 2.00
Kansas City, Mo.—50% thru 100 mesh 1.50
Krause and Columbia, Ill.—Analysis, 90% $CaCO_3$, 90% thru 4 mesh..... 1.20
Ladds, Ga.—Analysis, 61% $CaCO_3$, 35% $MgCO_3$—all passing 10 mesh 1.50@ 1.75
Lannon, Wis.—Analysis, 54% $CaCO_3$, 44% $MgCO_3$; 99% thru 10 mesh; 46% thru 60 mesh..... 2.00
Screenings (¼ in. to dust)..... 1.00
Marblehead, Ohio.—Analysis, 83.54% $CaCO_3$, 14.92% $MgCO_3$; 100% thru 4 mesh; 83% thru 10 mesh; bulk 1.25
Milltown, Indiana.—Analysis, 94.41% $CaCO_3$, 2.95% $MgCO_3$; 35% thru 50 mesh..... 1.40@ 1.65
Mitchell, Ind.—Analysis, 97% $CaCO_3$, 1% $MgCO_3$; 50% thru 100 mesh, 90% thru 4 mesh..... 1.25
Montrose, Iowa.—90% thru 100 mesh.. 1.25
Narlo, Ohio.—Analysis, 56% $CaCO_3$, 43% $MgCO_3$; limestone screenings, 37% thru 100 mesh, 55% thru 50 mesh, 100% thru 4 mesh..... 1.50@ 2.00
Ohio (different points), 20% thru 100 mesh, bulk..... 1.25@ 1.50
Piqua, Ohio—100% thru 4 mesh..... 1.25
River Rouge, Mich.—Analysis, 54% $CaCO_3$, 40% $MgCO_3$; bulk..... .80@ 1.40
Stolle, Ill., near East St. Louis on I. C. R. R.—Thru ¼-in. mesh..... 1.30
Stone City, Iowa.—Analysis, 98% $CaCO_3$; 50% thru 50 mesh..... .75
Toledo, Ohio.—¼ in. to dust, 30% thru 100 mesh..... 1.50
Waukesha, Wis.—No. 1 kiln dried..... 2.00
No. 2 Natural..... 1.75
Alderson, W. Va.—Analysis, 90¾% $CaCO_3$; 90% thru 50 mesh..... 1.75
Cape Girardeau, Mo.—Analysis, 93% $CaCO_3$, 3.5% $MgCO_3$; 90% thru 50 mesh..... 1.50
Claremont, Va.—Analysis, 92% $CaCO_3$, 2% $MgCO_3$; 90% thru 50 mesh..... 3.00
50% thru 50 mesh, 90% thru 4 mesh, 50% thru 4 mesh..... 2.75
Ft. Springs, W. Va.—Analysis, 90% $CaCO_3$; 90% thru 50 mesh..... 1.50
Ladds, Ga.—50% thru 50 mesh..... 2.00
Garnett, Okla.—Analysis, 80% $CaCO_3$, 3% $MgCO_3$; 50% thru 50 mesh..... .50
Kansas City, Mo., Corrigan Siding—50% thru 100 mesh; bulk..... 1.80
Tulsa, Okla.—90% thru 4 mesh..... .50

Miscellaneous Sands

Silica sand is quoted washed, dried and screened unless otherwise stated.

Glass Sand:

Berkeley Springs, W. Va..... 2.25@ 2.50
Cedarville and South Vineland, N. J.—Damp, 1.75; dry..... 2.25
Cheshire, Mass.—24 mesh, 5.00; 40 mesh, 6.00; 100 mesh..... 7.00
Columbus, Ohio..... 1.50@ 2.00
Dunbar, Pa.—Damp..... 2.50
Falls Creek, Pa..... 2.25
Hancock, Md.—Damp, 1.50; dry..... 2.00
Klondike and Pacific, Mo..... 2.00@ 2.50
Mapleton, Pa..... 2.25@ 2.50
Mapleton Depot, Pa..... 2.50
Massillon, Ohio..... 3.00
Michigan City, Ind..... .50
Millville, N. J. (green)..... 2.00
Mineral Ridge, Ohio..... 2.50@ 3.00
Montoursville, Pa..... 2.00
Oregon, Ill..... 2.50
Ottawa, Ill..... 1.50
Pittsburgh, Pa.—Dry, 4.00; damp..... 3.00
Rockwood, Mich..... 2.50@ 2.75
Round Top, Md..... 2.25
Sands, Pa..... 2.50
San Francisco, Calif..... 3.00@ 3.50
St. Louis, Mo..... 2.50@ 3.00
Thayers, Pa..... 2.25@ 2.50
Utica, Ill..... 1.50
Zanesville, Ohio..... 2.00@ 2.50

Foundry Sand:

Albany, N. Y.—Molding fine..... 2.25
Molding coarse..... 2.00
Sand blast (kiln dried)..... 4.50
Brass molding..... 2.25
Allentown, Pa.—Core and molding fine 1.75@ 2.00
Arenzville, Ill.—Molding fine..... 1.50@ 1.75
Brass molding..... 1.75
Beach City, Ohio.—Core, washed and screened..... 2.00@ 2.50
Furnace lining..... 2.50@ 3.00
Molding fine and coarse..... 2.25@ 2.50
Cheshire, Mass.—Furnace lining, molding fine and coarse..... 5.00
Sand blast..... 5.00@ 8.00
Stone sawing..... 6.00
Cleveland, Ohio.—Molding coarse..... 1.50@ 2.00
Brass molding..... 1.50@ 2.00
Molding fine..... 1.50@ 2.25
Core..... 1.25@ 1.50

(Continued on next page)

Wholesale Prices of Sand and Gravel

Prices given are per ton, f.o.b., at producing plant or nearest shipping point

Washed Sand and Gravel

City or shipping point	Fine Sand, 1/10 in. down	Sand, ¼ in. and less	Gravel, ½ in. and less	Gravel, 1 in. and less	Gravel, 1½ in. and less	Gravel, 2 in. and less
EASTERN:						
Attica, N. Y.	.75	.75	.75	.75	.75	.75
Ambridge and So. Heights, Pa.	1.25	1.25	1.25	.85	.85	.85
Buffalo, N. Y.	1.10	.95			.85	
Erie, Pa.		.90		1.00	1.25	
Farmingdale, N. J.	.48	.48	.75		1.10	
Hartford, Conn.	.90		1.25	1.15	1.15	1.15
Leeds Junction, Me.		.50	1.75		1.35	1.25
Machias, N. Y.	.75	.75	.85	.85	.85	.85
Pittsburgh, Pa.	1.25	1.25	1.25	.85	.85	.85
Portland, Me.		.50	1.75		1.35	1.35
Washington, D. C. (Rewashed, river)	.75	.75	1.60	1.40	1.20	1.20
CENTRAL:						
Alton, Ill.		.85				
Anson, Wis.	.50	.40				.90
Barton, Wis.		.40@ .60		.50@ .70	.50@ .70	
Beloit, Wis.		.70			.80	
Chicago, Ill.		1.75@2.23	1.75@2.43			
Cincinnati, Ohio	.70	.65	.90	.90	.90	.90
Columbus, Ohio	.75@1.00	.75@1.00	.75@1.00	.75@1.00	.75@1.00	.75@1.00
Des Moines, Iowa	.50	.50	1.25	1.60	1.60	1.60
			Unwashed ballast, .50 ton			
Dresden, Ohio	.70	.60	.60		.90	
Earlestead (Flint), Mich.	.70					
Eau Claire, Wis.	.40@ .45	.40	.85@1.15			.85
Elkhart Lake, Wis.	.66	.66	.70	.70	.70	.70
Ft. Dodge, Iowa		1.22		2.17		
Grand Rapids, Mich.		.50		.80		.70
Hamilton, Ohio	1.00	1.00	1.00		1.00	
Hawarden, Iowa	.60	.50			1.60	
Hersey, Mich.		.50			.75	
Indianapolis, Ind.	.60	.60		1.50	.75@1.00	.75@1.00
Janesville, Wis.		.65@ .75			.65@ .75	
Mason City, Iowa	.65	.60	1.70	1.75	1.65	1.65
Mankato, Minn.	.50	.50	1.25@1.35	1.25@1.35	1.25@1.35	1.25@1.35
Milwaukee, Wis.	1.11	1.11	1.36	1.36	1.36	1.36
Minneapolis, Minn.	.35	.35	1.25@1.35	1.25@1.35	1.25	1.25
Moline, Ill.	.60	.60	1.20	1.20	1.20	1.20
Riton, Wis.		.40			.60	
St. Louis, Mo., f.o.b. cars	1.20	1.45	1.65	1.45		
St. Louis, Mo., deliv. on job	2.05	2.20	2.35	2.15		2.10
Summit Grove, Clinton, Ind.	.65@ .75	.60@ .75	.60@ .75	.60@ .75	.60@ .75	.60@ .75
Terre Haute, Ind.	.75	.60	1.00	.90	.75	.75
Waukesha, Wis.	.50	.50	.80	.80	.80	.80
Winona, Minn.	.40	.40	1.25	1.25	1.10	1.10
			(.05 ton discount 10 days)			
SOUTHERN:						
Atlanta, Ga.	1.24	1.24	2.79	1.90	1.90	1.90
Birmingham, Ala.	1.29	1.29	2.79	1.79	1.64	1.54
Charleston, W. Va.	all sand 1.40		all gravel 1.50			
Estill Springs, Tenn.	1.35	1.35		1.00	.85	.65
Ft. Worth, Texas		1.50	1.50	1.50	1.50	1.50
Jackson's Lake, Ala.	.50@ .60	.50@ .60	.40@1.00	1.00	.50@1.00	.50@1.00
Knoxville, Tenn.	.75@1.00	.75@1.00	1.20	1.20	1.20	1.20
Lake Weir, Fla.		.60				
Macon, Ga.		.50@ .75				
Memphis, Tenn.	1.00	1.00	1.80	1.80	1.80	1.80
N. Martinsville, W. Va.	1.00				1.20	.80
New Orleans, La.	.25	1.35				
WESTERN:						
Grand Rapids, Wyo.	.50	.50	.85	.85	.80	.80
Kansas City, Mo.		(Kaw river sand, car lots, .75 per ton; Missouri river, .85)				
Los Angeles, Calif.		.70	1.20	1.20	1.10	1.10
Pueblo, Colo.	1.10*	.90*			1.50*	
San Diego, Calif.†	.50@ .70	.80@1.00	1.30@1.60	1.35@1.65	1.10@1.40	1.10@1.40
San Francisco, Calif.		1.00	1.00@1.20	.85@1.00	.85@1.00	.85@1.00
Seattle, Wash.	1.25*	1.25*	1.50*	1.25*	1.25	1.25*
Spring Valley, Calif.	.70	.80	1.40	1.35	1.25	1.25

Bank Run Sand and Gravel

City or shipping point	Fine sand, 1/10 in.	Sand, ¼ in.	Gravel, ½ in.	Gravel, 1 in.	Gravel, 1½ in.	Gravel, 2 in.
Atlanta, Ga.	.30@ .40	.30@ .40				
Boonville, N. Y.	.60@ .80		.55@ .75			1.00
Cape Girardeau, Mo.			River sand, .80 per yd.			
Cherokee, Iowa			.80 per ton—1.20 washed			
Dresden, Ohio		.60				
Dudley, Ky. (crushed sand)	1.00	1.00		.90		
East Hartford, Conn.			.65 per cu. yd.			
Elkhart Lake, Wis.	.70	.50			.60	.60
Estill Springs, Tenn.						.85
Fishers, N. Y.		.60			.55@ .60	
Grand Rapids, Mich.						.50
Hamilton, Ohio					.70	
Hartford, Conn.		1.00•				
Hersey, Mich.				.50		
Indianapolis, Ind.			Mixed gravel for concrete work, .65			
Lindsay, Texas						.55
Janesville, Wis.		.65			.65@ .75	
Mankato, Minn.			All sand and gravel .60 per ton			
Montezuma, Ind.			Road gravel .50 per ton			
Pine Bluff, Ark.			Road gravel .50			
Rochester, N. Y.	.60@ .75	.60@ .75			.50@ .65	.50@ .65
Roseland, La.	.25					
Saginaw, Mich., f.o.b. cars		.75	1.30	1.30	1.30	1.30
St. Louis, Mo.		About	60% gravel, 40% sand, 1.55			
Summit Grove, Ind.	.50	.50	.50	.50	.50	.50
Waco, Texas		.80		1.50		1.30
Winona, Minn.				.60		
York, Pa.		1.00@1.20	(crushed rock sand)			

• Cubic yard. B Bank. L Lake. || Ballast. † Low prices, wholesale; high prices, retail.

Crushed Slag

City or shipping point	Roofing	¼ in. down	½ in. and less	¾ in. and less	1½ in. and less	2½ in. and less	3 in. and larger
EASTERN:							
Buffalo, N. Y.	2.25@2.35	1.25@1.35	1.25@1.35	1.25@1.35	1.25@1.35	1.25@1.35	1.25@1.35
E. Canaan, Conn.	4.00	1.00	2.50	1.35	1.25	1.15	1.15
Eastern Penn. and Northern N. J.	2.50	1.20	1.50	1.20	1.20	1.20	1.20
Erie, Pa.			Crushed run slag, 4 in. and less, 1.25@1.35				
Emporium, Pa.			1.35	1.35	1.35	1.35	1.35
Sharpsville and West Middlesex, Pa.	2.00	1.30	1.70	1.30	1.30	1.30	1.30
Western Penn.	2.50	1.25	1.50	1.25	1.25	1.25	1.25
CENTRAL:							
Chicago, Ill.			All sizes, 1.50, f.o.b. Chicago				
Detroit, Mich.			All sizes, 1.65, f.o.b. Detroit				
Ironton, O.	2.05	1.45	1.75	1.45	1.45	1.45	1.45
Jackson, O.		1.35		1.35	1.35	1.35	1.35
Steubenville, O.	2.00	1.40	1.70	1.40	1.40	1.40	1.40
Toledo, O.	1.50	1.35	1.35	1.35	1.35	1.35	1.35
Youngstown, Dover, Hubbard, Leetonia, Struthers, O.	2.00	1.25	1.35	1.35	1.25	1.25	1.25
Steubenville, Lowellville, Canton, O.	2.00	1.35	1.60	1.35	1.35	1.35	1.35
SOUTHERN:							
Alabama City, Ala.	2.05	.80	1.25	1.15	1.10	.95	.85
Ashland, Ky.		1.55		1.55	1.55	1.55	1.55
Ensley, Ala.	2.05	.80	1.25	1.15	1.10	.95	.85
Longdale, Goshen, Glen Wilton and Low Moor, Roanoke, Va.	2.50	1.00	1.25	1.25	1.25	1.15	1.15

Lime Products (Carload Prices Per Ton F.O.B. Shipping Point)

	Finishing hydrate	Masons' hydrate	Agricultural hydrate	Chemical hydrate	Ground burnt lime, Blk.	Ground burnt lime, Bags	Lump lime, Blk.	Lump lime, Bbl.
EASTERN:								
Adams, Mass.			7.00				2.90	
Bellefonte, Pa.		10.50§	10.50§	10.50§	9.00		8.50	1.80
Buffalo, N. Y.				12.50				
Berkeley, R. I.			12.00					2.30
Cassadaga, N. Y.			Agricultural marl 7.00					
Chaumont, N. Y.					2.50	4.00		
Lime Ridge, Pa.							5.00	
West Rutland, Vt.	13.50	12.00					11.00	3.20
West Stockbridge, Mass.								2.25
Williamsport, Pa.			10.00			10.00	6.00	
York, Pa. (dealers' prices)		11.00	11.00	11.00			9.50	1.65
Zylonite, Mass.	3.20d	2.90d	7.00					
CENTRAL:								
Cold Springs, Ohio		11.00	10.50		9.00	11.00	10.00	
Delaware, Ohio		11.00	9.50	11.50			10.00	1.60
Gibsonburg, Ohio	12.50		10.50		9.00	11.00	10.00	
Huntington, Ind.	12.50	11.00	10.00		9.00		10.00	1.60
Luckey, Ohio	12.50a	11.00	10.00a		9.00			
Marblehead, Ohio		11.00	10.00				10.00	1.60
Marion, Ohio		11.00	10.00				10.00	1.80
Mitchell, Ind.				12.00	11.00		10.00	1.60
Sheboygan, Wis.							10.00	
White Rock, Ohio	12.50				9.00	11.00		
Woodville, O. (dlrs.' price)	12.50a	11.00a	10.00a				10.00	1.60
SOUTHERN:								
Erin, Tenn.							9.00	1.50
El Paso, Texas							9.00	1.50
Karo, Va.							7.00	1.50
Knoxville, Tenn.	12.50	11.00	11.00	11.00	9.00		9.00	1.50
Ocala and Zuber, Fla.	14.00	14.00		14.00				1.75
Sherwood, Tenn.	12.50	11.00	11.00	11.00			8.50	1.50
Staunton, Va.					4.50	5.50	8.50	1.35
WESTERN:								
Colton, Calif.			15.00				19.70	
Kirtland, N. M.							12.50	
San Francisco, Calif.	22.00	22.00	15.00	22.00				2.40
Tehachapi, Calif.							13.00	2.15

‡100-lb. sacks; *180-lb. net, price per barrel; †180-lb. net, non-returnable metal barrel; §paper sacks. (a) 50-lb. paper bags; terms, 30 days net, 25c per ton or 5c per barrel discount for cash in 10 days from date of invoice; (b) burlap bags; (c) 200-lb. barrels; (d) 280-lb. barrels net.

Miscellaneous Sands

(Continued from preceding page)

Columbus, Ohio.—Core	.50@ 2.00
Sand blast	4.50@ 5.50
Molding fine	2.75@ 3.00
Brass molding	2.50
Furnace lining	1.50@ 2.00
Sand blast	3.50@ 5.00
Molding coarse	1.50@ 2.50
Stone sawing	1.50@ 3.50
Traction	.50@ .90
Delaware, N. J.—Molding fine	2.00
Molding coarse	1.90
Brass molding	2.15
Dunbar, Pa.—Traction, damp	2.50
Dundee, Ohio.—Glass, core, sand blast traction	2.50
Molding fine, brass molding (plus 75c for winter loading)	2.00
Molding coarse (plus 75c for winter loading)	1.75
Eau Claire, Wis.—Core	1.00@ 1.25
Sand blast	3.25@ 3.75
Falls Creek, Pa.—Molding, fine and coarse	1.75
Sand blast	2.00
Traction	1.75
Franklin, Pa.—Core	2.00
Furnace lining	2.50
Molding fine and coarse	2.00
Brass molding	2.00
Greenville, Ill.—Molding coarse	1.30@ 1.60
Joliet, Ill.—No. 2 molding sand and loam for luting purposes; milled	.80
Bank run	.65
Kansas City, Mo.—Missouri river core	.80
Kasota, Minn.—Molding fine	1.60@ 1.85
Molding coarse, stone sawing	1.45@ 1.75
Klondike, Pacific, Gray Summit, Mo.—Molding fine and coarse, stone sawing, roofing sand	2.00
Mapleton Depot, Pa.—Brass molding	2.00
Molding fine	2.00
Roofing sand	2.50
Mapleton, Pa.—Glass, core, furnace lining, molding fine and coarse; damp, 2.00; dry	2.75
Massillon, Ohio—Molding fine and coarse, furnace lining	3.00
Traction, core	2.75
Michigan City, Ind.—Core, traction	.50
Mineral Ridge, Ohio.—Core, furnace lining, molding fine and coarse, roofing sand, sand blast, stone sawing, traction, brass molding (green)	2.25
Montoursville, Pa.—Core	1.25@ 1.40
Traction	1.00@1.25
New Lexington, Ohio—Molding fine	2.25
Molding coarse	2.00
Oregon, Ill.—Core	1.50@ 2.00
Sand blast	4.00
Stone sawing	2.00@ 2.50
Ottawa, Ill.—Core	1.50@ 2.00
Furnace lining and traction	1.50
Roofing sand	1.75
Sand blast	4.50
Stone sawing	3.00
Brass molding	2.50
Molding, coarse (crude)	.85@ 1.00

(Continued on next page)

Miscellaneous Sands

(Continued)

Rockwood, Mich.—Core	1.90@ 2.50
Roofing	2.75
Sand blast	3.75
Round Top, Md.—Core (damp)	1.60
Traction (damp)	1.75
Roofing sand	2.25
San Francisco, Calif. (washed and dried)—Core, molding fine, roofing sand and brass molding	3.00@ 3.50
(Direct from pit)	
Furnace lining, molding coarse, sand blast	3.60
Stone sawing, traction	2.30
St. Louis, Mo.—Red heavy molding	1.50@ 2.25
Red fine	1.50@ 2.00
Molding fine and brass	2.00@ 3.00
Skein core	1.75@ 2.25
White core sand	1.00@ 1.75
Sand blast	2.00@ 4.50
Furnace lining	1.50@ 2.50
Sand blast	2.00@ 4.50
Roofing sand	1.00@ 1.50
Stone sawing	1.25@ 2.00
Thayers, Pa.—Core	2.00
Furnace lining, molding fine and coarse	1.25
Traction	2.00
Utica, Ill.—Core, furnace lining, molding coarse, brass molding	.85@ 1.50
Molding fine, traction	1.50
Roofing sand, stone sawing	1.50@ 2.00
Sand blast	2.00
Warwick, Ohio.—Furnace lining, dry 1.75, green	2.00
Molding fine and coarse, dry 2.50; green	1.75
Traction and brass molding	2.50
Core, dry	2.50@ 2.75
Core, green	1.75
Zanesville, Ohio.—Molding fine, brass molding	1.75@ 2.00
Molding coarse	1.50@ 1.75

Talc

Prices given are per ton f.o.b. (in carload lots only), producing plant, or nearest shipping point.

Asheville, N. C.—Best white and 200-mesh (per ton)	8.00
Yellow (per ton)	9.00
Red (per ton)	13.00
Baltimore, Md.—Crude talc (mine run)	3.50
Ground talc (20-50 mesh), bags	10.00
Ground talc (150-200 mesh), bags	12.00
Cubes	60.00
Blanks (per lb.)	.08
Chatsworth, Ga.—Crude talc	4.50
Ground talc (150-200 mesh); bags	8.00@10.00
Chester, Vt.—Crude talc	3.50@ 5.00
Ground talc (150-200 mesh), bags	7.00@ 9.00
Emeryville, N. Y.—325 mesh (double air floated), bags	14.75
Hailesboro, N. Y.—Ground talc (150-250 mesh), bags	18.00
Henry, Va.—Crude talc (lump mine run) per 2000-lb. ton	2.50@ 3.50
(150-200 mesh), bags	10.00@12.50
Los Angeles, Calif.—Crude	15.00@22.00
Los Angeles, Calif.—Crude talc f.o.b. Silver Lake	7.00@12.00
Ground talc (150-200 mesh), 100-200 lb. bags)	12.00@14.00
Mertztown, Pa.—Ground talc (20-50 mesh); bulk, 5.00; bags	6.00
(150-200 mesh); bulk, 7.00; bags	8.00
Natural Bridge, N. Y.—Ground talc (150-200 mesh) bags	12.00@13.00
Rochester and East Granville, Vt.—Ground talc (20-50 mesh), bulk	8.50@10.00
Ground talc (150-200 mesh), bulk	10.00@22.00
Vermont—Ground talc (20-50 mesh); bags	7.50@10.00
Ground talc (150-200 mesh); bags	8.50@15.00
Waterbury, Vt.—Ground talc (20-50 mesh), bulk	5.00
(Bags 1.00 extra)	
Ground talc (150-200 mesh), bulk	8.00@14.00
(Bags 1.00 extra)	
Pencils and steel workers' crayons, per gross	1.20@ 2.00

Rock Phosphate

(Raw Rock)

Per 2240-lb. Ton

Centerville, Tenn.—B.P.L. 65%	6.00@ 8.50
B.P.L. 65%	6.00
Gordonsburg, Tenn.—B.P.L. 68-72%	5.50@ 6.50
Mt Pleasant, Tenn.—Analysis, .65-70% B.P.L. (2000 lb.)	6.50
Paris, Idaho.—2000 lb. mine run, B.P.L. 75%	4.50@ 5.00
Ottawa, Minn.—All crude silica sand	.75@ 1.00

Roofing Slate

The following prices are per square (100 sq. ft.) for Pennsylvania Blue-Gray Roofing Slate, f. o. b. cars quarries:

Sizes	Genuine Bangor, Washington Big Bed, Franklin Big Bed	Genuine Albion	Slatington Small Bed	Genuine Bangor Ribbon
24x12	$10.20	$8.40	$8.10	$7.50
24x14	10.20	8.40	8.10	7.50
22x12	10.80	8.70	8.40	7.80
22x11	10.80	8.70	8.40	7.80
21x12	12.60	9.00	8.70	8.10
20x10	12.60	9.00	8.70	8.10
18x10	12.60	9.00	8.70	8.10
18x 9	12.60	9.00	8.70	8.10
16x10	12.60	8.70	8.40	7.80
16x 9	12.60	8.70	8.40	7.80
16x 8	12.60	8.70	8.40	7.80
18x12	12.60	9.00	8.70	8.10
16x12	12.60	8.70	8.40	7.80
14x10	11.10	8.40	8.10	7.50
14x 8	11.10	8.40	8.10	7.50
14x 7 to 12x6	9.30	8.10	7.50	7.50
	Mediums	Mediums	Mediums	Mediums
24x12	$ 8.10	$8.10	$7.20	$5.75
22x11	8.40	8.40	7.50	5.75
Other sizes	8.70	8.70	7.80	5.75

For less than carload lots of 20 squares or under, 10% additional charge will be made.

(Continued from preceding page)

(Ground Rock)

Wales, Tenn.—B.P.L. 70%	7.75
Per 2000-lb. ton	
Barton, Fla.—Analysis, 50-65% B.P.L.	3.50@ 8.00
Centerville, Tenn.—B.P.L., 60-65%	6.50
B.P.L. 75% (brown rock)	12.00
Benotis, Fla.—Analysis 77-82% B.P.L.	8.00
Montpelier, Idaho. — Analysis, 72% B.P.L., crushed and dried	3.75
Mt. Pleasant, Tenn.—B.P.L. 65%	5.60
Twomey, Tenn.—B.P.L. 65%	6.50

Florida Soft Phosphate

(Raw Land Pebble)

	Per Ton
Benotis, Fla.—Analysis 26-28% phosphoric acid—200 lb. sacks, carload lots	10.00
Jacksonville (Fla.) District	10.00@12.00

(Ground Land Pebble)

	Per Ton
Jacksonville, Fla., District	14.00
Add 2.50 for sacks.	
Morristown, Fla.—26% phos. acid	16.00
Mt. Pleasant, Tenn.—65% B.P.L.	5.95

Fluorspar

Fluorspar—80% and over calcium fluoride, not over 5% silica; per ton f.o.b. Illinois and Kentucky mines	22.00
Fluorspar—85% and over calcium fluoride, not over 5% silica; per ton f.o.b. Illinois and Kentucky mines	23.50

Special Aggregates

Prices are per ton f. o. b. quarry or nearest shipping point.

City or shipping point	Terrazzo	Stucco chips
Chicago, Ill.—Stucco chips, in sacks f.o.b. quarries		17.50
Deerfield, Md. — Green; bulk	7.00	7.00
Easton, Pa.—Evergreen, creme green and royal green marble	16.00@20.00	16.00@20.00
Slate granules		6.50@ 7.00
Granville, N. Y.—Red slate granules		7.50
Harrisonburg, Va.—Blk. marble (crushed, in bags)		12.50
Ingomar, Ohio (in bags)	6.00@14.00	10.00@25.00
Milwaukee, Wis.		14.00@26.00
New York, N. Y.—Red and yellow Verona		32.00
Middlebrook, Mo.—Red		25.00@30.00
Phillipsburg, N. J.	16.00@20.00	14.50@18.00
Poultney, Vt.—Slate granules		7.50
Red Granite, Wis.		7.50
Sioux Falls, S. D.	7.50	7.50
Tuckahoe, N. Y.—(2000 lb.)		8.00@12.00
Whitestone, Ga.—White marble chips, net ton in bulk, f.o.b., bags 12½c extra	4.50	4.50

Concrete Brick

Prices given per 1000 brick, f.o.b. plant or nearest shipping point.

	Common	Face
Appleton, Minn.	22.00	27.00@35.00
Carpenterville, N. J.	19.00	31.50
Easton, Pa.	16.00	40.00@60.00
Ensley, Ala.	16.00	6.00
Eugene, Ore.	25.00@26.00	50.00@75.00
Friesland, Wis.	22.00	32.00
Houston, Tex.		19.50
Omaha, Neb.	18.00	30.00@40.00
Portland, Ore. (Del'd)	21.00	30.00@60.00
Puyallup, Wash.	20.00	30.00@75.00
Rapid City, S. D.	18.00	25.00@40.00
St. Paul, Minn.	15.00	30.00@37.50
Salem, Ore.	25.00	35.00@50.00
Salt Lake City, Utah	17.00@18.00	35.00@40.00
Springfield, Ill.	18.00	20.00@25.00
Wauwatosa, Wis.	15.00@16.00	28.00@75.00
Watertown, N. Y.	21.00@22.50	35.00@37.50
Winnipeg, Can.	18.00	26.00

Sand-Lime Brick

Prices given per 1,000 brick f. o. b. plant or nearest shipping point, unless otherwise noted.

Barton, Wis.	11.00
Boston, Mass.	16.50
Buffalo, N. Y.	16.50
Dayton, Ohio	12.50@13.50
Grand Rapids, Mich	12.00
Lancaster, N. Y.	15.00
Michigan City, Ind.	12.00
Milwaukee, Wis. (delivered)	14.00
Minneapolis, Minn.	13.00
Plant City, Fla.	10.00
Portage, Wis.	15.00
Rives Junction, Mich.	12.00
Saginaw, Mich.	12.00
San Antonio, Texas	13.00
San Antonio, Texas (deliv. city lts.)	15.00
South Dayton, Ohio	12.50@13.50
Syracuse, N. Y. (delivered at job)	20.00
F.o.b. cars	15.00
Washington, D. C.	14.50

Gray Clinker Brick

El Paso, Texas	13.00

Lime

Warehouse prices, carload lots at principal cities.

	Hydrate per Ton Finishing	Common
Atlanta, Ga.	22.50	14.00
Baltimore, Md.	24.25	17.25
Cincinnati, Ohio	16.80	14.30
Chicago, Ill.	20.00	20.00
Dallas, Tex.	22.00	.....
Denver, Colo.	24.00	.....
Detroit, Mich.	21.00	20.00
Detroit, Mich.	21.00	20.00
Minneapolis, Minn. (white)	25.50	21.00
Montreal, Que.	21.00	21.00
New York, N. Y.	18.20	13.10
St. Louis, Mo.	23.20	20.00
San Francisco, Calif.	22.00	.....
Seattle, Wash. (paper sacks)	24.00	.....

Portland Cement

Prices per bbl. and per bag net in carload lots

	Per Bag	Per Bbl.
Atlanta, Ga.	.....	2.78
Boston, Mass.	.....	2.68
Buffalo, N. Y.	.....	2.53
Cedar Rapids, Iowa	.62	2.48
Cincinnati, Ohio	.63½	2.54
Cleveland, Ohio	.61½	2.36
Chicago, Ill.	.55	2.20
Columbus, Ohio	.....	2.39
Dallas, Texas	.56½	2.25†
Davenport, Iowa	.60¾	2.43
Dayton, Ohio	.....	2.38
Denver, Colo.	.....	2.65
Detroit, Mich.	.62	2.37
Duluth, Minn.	.56¼	2.14
Indianapolis, Ind.	.60¼	2.41
Kansas City, Mo.	.61¼	2.45
Los Angeles, Cal. (less 5c dis.)	.....	3.26
Memphis, Tenn.	.....	2.84
Milwaukee, Wis.	.59¼	2.37
Minneapolis, Minn.	.62½	2.39
Montreal, Canada (sks. 20c ext.)	.....	2.40
New Orleans, La.	.....	2.83
New York, N. Y.	.....	2.40‡
Philadelphia, Pa.	.....	2.56
Phoenix, Ariz.	.....	3.70
Pittsburgh, Pa.	.56	2.35
Portland, Ore.	.....	3.05
San Francisco, Cal.	.....	2.63*
St. Louis, Mo.	.58¾	2.35
St. Paul, Minn.	.62½	2.39
Seattle, Wash. (10c bbl. dis.)	.....	2.90
Spokane, Wash.	.....	.....
Toledo, Ohio	.62	2.38

†Sack 10c ext.; 10c dis. 10 days.
‡Alongside dock, 2.70.
*Warehouse, 3.15.
NOTE—Add 40c per bbl. for bags.

Mill prices f. o. b. in Carload Lots to Contractors

	Per Bag	Per Bbl.
Buffington, Ind.	.48¾	1.95
Cincinnati, Ohio	.....	3.00†
Concrete, Wash.	.....	2.60
Dallas, Texas	.....	2.15
Dayton, Ohio	.....	2.85†
El Paso, Tex.	.....	3.20*
Hannibal, Mo.	.....	2.10
Hudson, N. Y.	.....	2.20
Indianapolis, Ind.	.....	2.96†
Leeds, Ala.	.....	2.20
Los Angeles, Calif.	.....	2.80
Louisville, Ky.	.....	2.92†
Memphis, Tenn.	.....	3.24†
Northampton, Pa.	.....	2.10
Phoenix, Ariz.	.....	4.30‡
Steelton, Minn.	.51½	1.95
Universal, Pa.	.50	2.00

†Including cloth sacks.
*Gross, 10c sacks and 10c per bbl. disc 10 days.
‡Gross, 15c sacks and 5c per bbl. disc. 10 days.

Gypsum Products—CARLOAD PRICES PER TON AND PER M SQUARE FEET, F. O. B. MILL

	Crushed Rock	Ground Gypsum	Agricultural Gypsum	Stucco* Calcined Gypsum	Cement‡ and Gauging Plaster	Wood Fiber	White§ Gauging	Sanded Plaster	Keene's Cement	Trowel Finish	—Plaster Board— ¼x32x36" Weight 1500 lb. Per M Sq. Ft.	⅜x32x36" Weight 1850 lb. Per M Sq. Ft.	Wallboard, ⅜x32 or 48" Lengths 6'-10', 1850 lb. Per M Sq. Ft.
Douglas, Ariz.	.....	6.00	6.00	.....	13.00	.....	.....	.....	.....	.....	.....	.....	.....
Fort Dodge, Iowa	3.00	3.50	6.00	8.00	10.00	10.50	20.00	.....	21.30	20.00	20.00	.....	30.00
Garbutt, N. Y.	.....	.....	6.00	8.00	10.00	10.00	.....	7.00	.....	.....	.....	20.00	.....
Grand Rapids, Mich.	3 00	.....	5.00	10.00	10.00	10.00	.....	.....	31.00	.....	19.75	20.00	30.00
Hanover, Mont.	4 50	.....	6.00	10.00	.....	10.50	.....	.....	.....	.....	.....	.....	.....
Mound House, Nev.	.....	8.50	6.50	10.50@11.50	.....	.....	.....	.....	.....	.....	.....	.....	.....
Oakfield, N. Y.	3.00	4.00	6.00	8.00	10.00	10.00	20.20	7.00+	30.75	21.00	19.375	20.00	30.00
Rapid City, S. D.	4.00	.....	.....	10.00	11.00	11.50	.....	.....	33.75	.....	.....	.....	.....
San Francisco, Calif.	.....	.....	.....	16.40	.....	.....	.....	.....	.....	.....	.....	.....	.....
Winnipeg, Man.	5.50	5.50	7.00	13.50	15.00	15.00	.....	.....	.....	.....	28.50	.....	35.00

NOTE—Returnable Bags, 10c each; Paper Bags, $1.50 per ton extra (not returnable).
*Shipment in bulk 25c per ton less; ‡Bond plaster $1.50 per ton additional; +Sanded Wood Fiber $2.50 per ton additional; §White Moulding 50c per ton

News of All the Industry

Incorporations

The Western Stone Co. has been incorporated in Oakland, Calif., for $200,000, by J. Samwell, F. W. Smith, J. J. Vaughn, O. Andres and M. Boker.

The Nelson Lime and Cement Co., with a capital of $15,000 has been incorporated at Memphis, Tenn., by W. A. Nelson, Jr., W. B. Patterson and G. A. Lambert.

The Peterson Sand and Gravel Co., 3240 North California avenue, Chicago, has been incorporated for $100,000 by C. A. Petersen, G. R. Bascom, H. R. Hanson, H. M. Railton and Catherine Immel. Joseph P. Immel, 3129 North California avenue, is correspondent.

The Lewiston Crushed Stone Co. has been incorporated at Lewiston, Maine, with a capital stock of $50,000. The directors are Arthur Martin, J. Nazaire Therriault, and Lucien Martin, all of Lewiston.

The Midway Lime and Cement Co., Culver City, Calif., has been incorporated for $50,000 by J. J. Beichel, Bert E. Anderson and J. C. Longueville.

The Pioneer Marl and Lime Corp. has been incorporated for $5000, at Altoona, Iowa. George W. Anderson, president; Robert A. Weston, vice-president; L. O. Schaffer, secretary.

The Standard Sand and Gravel Co., Dallas, Texas, has been incorporated for $10,000 by M. Whitley, E. C. Lumley and J. E. Armstrong.

The Stone Homes Process, Gainesville, Fla., has been incorporated for $100,000 by B. Kickler and associates.

The Hercules Sand Co. has been incorporated by Carl F. Bierrich for $25,000 at Galliopolis, Ohio.

Sand and Gravel

The Benedict Gravel Co.'s holding at Ionia, Mich., are to be taken over by a newly organized company which has also acquired a 160-acre farm west of Ionia. The capitalization is $150,000. It is expected that dredging operations will be begun in 30 days.

Sac County, Iowa, has bought a county gravel pit for $3500. The material is to be used on county roads.

The Grand Rapids (Mich.) Gravel Co. has received permission from the Kent county commissioners to tunnel under the Granville road to facilitate the transportation of gravel from the pit to the railroad. The tunnel will be 42 ft. wide.

The Rock River Sand and Gravel Co., Dixon, Ill., is erecting a $10,000 plant. H. Franks president, and E. Lloyd secretary.

The Waukesha Washed Sand and Gravel Co. has acquired sand and gravel lands near Burke, Wis. It is said that the company will spend $50,000 on new machinery and equipment. George Brew, president and general manager.

The Penglase Engineering Co. has placed an order with the Lidgerwood Co., New York City, for two new engines for the sand and gravel plant which the company is operating at Greyville, Ill. One is a three-drum, 10x12 hoisting engine, and the other is a 6¼x8 compound swinging engine. They will be placed on the shore derrick of the plant.

The Alabama Power Co. contemplates the establishment of a gravel pit near Tuskegee, Ala.

The Kaiser Construction Co., Oakland, Calif., has purchased 26 acres on the Mocho creek between Pleasanton and Livermore. The land was owned by Arthur Holm. The property, which is a deposit of gravel, will be mined by the company, the output being sold for building and road purposes. Included in the purchase beside the land in the creek bottom is seven acres in the extreme western part of the town of Livermore, which will give the purchaser access to the Southern Pacific tracks, so that a spur track may be laid to the creek bottom. Representatives of the construction company state that the present plans of the company call for the expenditure of $70,000 in putting in machinery for the gravel pit and washing outfit. Later it is planned to erect machine shops on the land.

Lime

The Builders Lime and Cement Co., Davenport, Iowa, Hans Goos, secretary, is about to begin construction of a reinforced concrete warehouse to cost $100,000.

Quarries

The Kettle River Quarries Co., Madison, Ill., has been purchased by the Kettle River Treating Co. for a consideration of $50,000. The purchase includes all the equipment of the quarries company and 44 acres of land in Venice township. At the same time the Kettle River Treating Co. filed articles of incorporation listing capital stock amounting to $750,000. The concern is engaged in the buying and selling of creosote, oils, tars and similar products.

The Feather Stone Quarries, Covina, Calif., is making improvements all the time, increasing the capacity of its plant. A great deal of the material is being sacked and shipped in powder form for insulating material. There are two kilns for drying and burning the brick, which is used in building furnaces, as it is impervious to heat. A new power line has just been completed to the plant which will materially increase its handling power. Crude oil is used for the burners in the kilns, hauled by oil tank wagons. One whole hill is uncovered, exposing quantities of diatomaceous earth, and a new hill is also being opened with slightly different composition. Little by little a market is being created which promises to handle all the possible output of the plant.

The Spartanburg Quarries Corp., operating the quarry near Pacolet, S. C., expects shortly to reach a production of 15 carloads of crushed stone daily.

David M. Picton & Co., Inc., has organized the Huntsville Stone Crusher Co., with head offices at Huntsville, Texas, and has leased the rock mountain near Huntsville from Gibbs Bros. & Co. The work of opening the quarry has been under way for some time, and it is expected that the first shipment will be made in about six weeks to Sabine jetties where Picton & Co. have a contract to furnish the government with 40,000 tons of crushed rock. It is estimated that there is more than a 1,000,000 ton of rock in the deposit and it will take many years to exhaust the supply.

The Ezell Mill and Stone Co., Newson Station, Tenn, is reported to have set off the largest blast ever fired in the state in which 20,000 tons of dynamite was used. Two hundred holes had been drilled, and the fuses were lighted simultaneously. C. H. Simpson, chairman of the Davidson County Highway Commission, was a spectator. A number of engineers from the state highway department were also present. The stone will be used by the highway department in road construction.

The Buchanan County Quarry Co., St. Joseph, Mo., has added a 50-yd. power shovel to its equipment. This company has recently contracted to supply the stone for a new sewer project and several city street improvements.

The White River Marble and Building Stone Co., which operates three large quarries near Little Rock, Ark., has just received three carloads of new machinery.

The Cardiff Green Marble Co., Cardiff, Md., has increased its capital stock from $500,000 to $750,000.

The Spring River Stone Co., Carthage, Mo., has let a contract for a $40,000 saw mill at the stone quarry.

Cement

The Gulf States Portland Cement Co., Demopolis, Ala., has leased the O'Rear coal mine near Jasper, Ala., for five years and agrees to pay royalty on a minimum of 25,000 tons annually.

The Yosemite Portland Cement Co. is about to begin the erection of a three-kiln plant at Merced, Calif., with a daily capacity of 200 bbl. Offices have been opened in the new Simpson building, Merced. George E. Nicholson, Kansas City, Mo., is president.

The Pacific Portland Cement Co., San Francisco, has filed an application with the War Department to dredge shells from submerged lands on the southern arm of San Francisco bay.

The Monolith Portland Cement Co., Los Angeles, Calif., has opened offices in Seattle, Wash.

The Superior Portland Cement Co., Bellingham, Wash., held its second annual celebration at Concrete, Wash., on August 11.

The Pacific Portland Cement Co., which is to build one of the largest manufacturing plants in the West, near Redwood City, Calif., has made application to have its land excluded from the corporation of Redwood City.

The Colorado Portland Cement Co., Canyon City, Colo., has now repaired all the damage caused by the flood of June 16, and is operating at full blast.

The Southeastern Portland Cement Co., recently organized, has established temporary offices at the Hotel Dempsey, Macon, Ga., to carry out construction plans and make purchases for its new plant at Ainslie, on which work will commence at an early date. It will have a capacity of 3000 bbl. per day, and is estimated to cost $2,000,000. The company will also install quarrying machinery, crushing and pulverizing equipment, etc., on a local limestone deposit. G. P. Dieckman is vice-president and general manager.

The Lehigh Portland Cement Co. is spending about $35,000 on a new cement dam to supply waterpower to run the plant at Metaline, Wash.

The Manitowoc Portland Cement Co., operated by the Newaygo Portland Cement Co., Newaygo, Mich., will take bids early in September for its new plant, to consist of a main one-story unit, 75x500 ft., with power plant and other buildings, estimated to cost $1,200,000. The MacDonald Engineering Co., 53 West Jackson boulevard, Chicago, is engineer. Clay Hollister, 521 Fulton street, Grand Rapids, Mich., is president.

Slate

The Portland-Monson Slate Co., Bangor, Me., is building a large addition to its mill and will install several saws and planers. A new pit is being opened west of the pits now being operated and work is again going on at the pits of the company on the Bray farm.

The Northampton Hard-Vein Slate Co., Easton, Pa., has abandoned its operation and petitioned the courts to surrender its charter. The Whitesell Brothers and interest will concentrate their attention on the quarries of the Theo. Whitesell Co., Inc.

Owen W. Owens Sons Co., concluded a contract with the Ruberoid Co. for the erection of a mill by the latter company in Granville, N. Y., near their quarries, for the production of slate veneer shingles, with full slate surface and a backing of Ruberoid felt.

Phosphate Rock

Tampa Fla., is to have a superphosphate plant costing $1,500,000, according to a newspaper dispatch from Albany, Ga.

Eldor Nance, Dallas, Texas, has leased 104 acres of land near Austin, Texas, which he plans to develop.

C. E. Thorne of the Ohio Experiment Station, Columbus, Ohio, recently published data on experiments in the use of fertilizers on the leading soil types scattered over the state, which justify the use of acid phosphate on all crops generally grown in Ohio and on all soils that have been under cultivation. In more than 40 experiments on the 14 experiment farms, acid phosphate is used alone, with potash, and with potash and nitrogen and in every experiment acid phosphate has produced a large and profitable incease.

The Savannah Fertilizer Co.'s plant on the Schuylkill river, Philadelphia, Pa., was destroyed by fire with a loss estimated at $125,000. Cause of the fire is unknown.

(Continued on page 62)

Rock Asphalt

Ada, Okla.—The large asphalt mines on the Carney farm, west of here closed down for some time, will again open for business soon, according to advices given out by an officer of the company.

The Vernon Asphalt Co., Butler, Mo., is now in progress of incorporation and a test of the asphalt field in the Bellamy district will be made. The board of directors are the following: L. B. Ewing, J. R. Davis, S. Simon, G. Kaupp and R. M. Hughes.

The General Asphalt Co., Philadelphia, Pa., reports business the first seven months of 1923 has run well ahead of the corresponding period of 1922. Sales of native asphalt for street and road building and replacement, have, for the 7 months ended July 31, increased 10 per cent; roofing and miscellaneous products increased in the East from $1,500,000 in the 1922 period to $2,250,000; and in the West from $1,300,000 to $1,750,000; Gilsonite (varnish product) has increased 30 per cent.

Southern Rock Asphalt Co. will erect a $150,000 plant at Flint, Ala., and a road and sheet asphalt plant at Nitro, Va., according to a Georgia paper.

Gypsum

Freedom, Okla.—It is reported a large financing firm of New York City are selling stock in this district for a gypsum mill to be erected between Freedom and Fair Valley, on the Cimarron river. The company will be capitalized at $200,000.

The American Gypsum Co.'s plants at Port Clinton, Ohio are shipping 15 cars of wall plaster board to the Bahama Islands.

Agstone

Prof. George Roberts, head of the agronomy department of the Kentucky College of Agriculture, is advocating the erection of sheds for storing agricultural limestone at the railway stations of the state. With these, a farmer can bring home a load of lime every time he has to haul any of the products of the farm to the station.

Hubert Stokes and John Lovelace have started a small lime-crushing plant near Rogers, Ark. The present capacity is two tons an hour, but it will be increased as the demand increases.

Sand-Lime Brick

The Sand-Lime Brick Co., 1008 Vinton building, Detroit, will take bids early in September for a new plant at River Rouge, Mich., to cost about $75,000, including machinery and electric power equipment.

The Sand-Lime Products Co., Detroit, has increased its capital stock from $50,000 to $100,000.

Concrete Products

The Riverside Products Co. has moved from Los Angeles to Riverside, Calif., and will manufacture an interlocking concrete tile, which is a new product for the construction of buildings.

The Silver Hill Concrete Products Co. has been incorporated in Silver Hill, Md., to develop silica rock, sand gravel and clay deposits by Leonard J. Mathers, John G. Bridahas and John Campbell.

The Washington Concrete Products, Wilmington building, New York, has been incorporated for $100,000, to deal in building materials.

The Northwestern Davenport Cement Block Co., Davenport, Iowa, is to build a factory.

The United Railways and Electric Co., Baltimore, Md., will erect a concrete pole plant near Carrol Park.

The Anchor Concrete Co., Adrian, Mich., is building a second addition to its plant.

The Everlastone Products Co., Baltimore, Md., of which Albert I. Rankin, 119 N. Collington ave., is president, plans the enlargement of its plant, which manufactures magnesite stucco and composition flooring.

The Bradbyer Dunntile Mfg. Co., Tulsa, Okla., of which L. J. Campbell is secretary, will erect a 100x100-ft. factory building, to cost about $10,000, to make concrete tile and concrete blocks of various kinds.

The Black Creek Tile Co. has been incorporated in Black Creek, Wis., for $7000, to make concrete drain tile, etc., by G. J. Riehl and F. A. Brandt.

The Concrete Garage Mold Corp. has been incorporated at Baltimore, Md., with a capital stock of $200,000, to manufacture knock-down molds, frames, etc., to use in making garages, by C. A. Spellshouse, A. A. Blakeney and R. G. Harrison.

The Babcock Concrete Block Co. has been incorporated in Milwaukee, Wis., with a capital stock of $25,000, by O. Babcock, and C. Johnson.

The Cinder Block Corp., 1102 Lexington bldg., Baltimore, Md., has been formed with a capital stock of $100,000, and will erect a building and will install machinery with a capacity of 3000 cinder blocks per day. C. P. Minning is president and H. G. Porter, secretary.

The Cinder Brick and Tile Co. and the **Cinder Products Co.**, both of 1 Exchange place, Jersey City, have been incorporated with David F. Edwards as agent. Capital stock authorized for the Cinder Products Co., 150 shares without par value, and capital authorized for the Cinder Brick and Tile Co., $100,000. Each company has 15 shares taken by the incorporators, who are as follows, for both companies, each incorporator taking 5 shares: D. F. Edwards, T. Rurode and J. J. Breslin.

The California Encaustic Tile Co., Ontario, Calif, has been incorporated for $100,000.

The Concrete Products Co., Grand Haven, Mich., recently organized, plans for the operation of a local plant for the manufacture of a line of concrete and cement products. G. Bendler heads the company.

The Silver Hill Concrete Products Co., Silver Hill, Mo., recently organized, has tentative plans for the establishment of a factory to manufacture concrete specialties. L. J. Mathers and J. Campbell, Silver Hill, head the company.

The Cement Building Products Association, Abington, N. Y., has got under way manufacturing at the Liberty Munitions plant, recently taken over, having installed its machinery and received stock there. Patent cement tiling and cement building blocks are to be made there.

The Wege Marble and Tile Co., Columbus, Ohio, has executed much of the marble and tile work in the Atlas building. This concern has furnished tile and marble for many of the prominent office buildings and homes in this territory.

The Anchor Concrete Co., Adrian, Mich., expects to have the addition, which is to be about 60 ft. wide and 80 ft. long, which will add greatly to the production capacity of the plant finished by October 1. The company is adding more men to its force now in anticipation of need for them when the enlargement has been completed.

Dealers

The Service Products Corp., 38 So. Dearborn st., Chicago, Ill., has been incorporated by E. C. Carlson, A. C. Fischer and W. J. Evrard, to manufacture and deal in roofing and construction materials.

The Woods Sand and Coal Co., Roanoke, Va., has been incorporated for $25,000. S. E. Woods, president; J. K. St. Clair, secretary.

Manufacturers

Wightman & Hicks, Inc., 50 Union Square, New York, announce under date of August 1 that they have acquired and consolidated the businesses of Charles Austin Hirschberg, Inc., and Lucius I. Wightman. The new officers are Lucius I. Wightman, president; H. L. Hicks, vice-president and treasurer; and E. M. Hoberg, secretary.

The Fuller-Lehigh Co., Fullerton, Pa., advises that an agreement has been consumated whereby that company will act as sole licensees in the United States and Canada for all new business of the Quigley Fuel Systems, Inc. The engineering personnel of the Quigley Fuel Systems, Inc., has become associated with the Fuller Engineering Co. and are now in a better position to render more complete engineering services, as by this arrangement designs can be presented from a wider selection of pulverized fuel equipment. In the future all business of the Quigley Fuel Systems, Inc., will be conducted through the main and branch offices of the Fuller Engineering Co.

Trade Literature

The Industrial Works, Bay City, Mich., has issued a Golden Anniversary Catalog commemorating 50 years' of service to American industry and containing complete illustrations, engineering data and performance records of its products. There are illustrations and full description of a trip through the Industrial Works plant, representing its products from foundry practice to the final testing upon completion. Section 1 illustrates and describes rail, traction and crawling tractor cranes from 5 to 60 ton capacities. Eleven different types within these capacities are explained with full engineering and operating data. Section 2 treats of clamshell buckets, grapples, magnets, generators, dragline, skipper arms, scale proof boilers, oil burners, hoisting equipment and special booms. Section 3 presents the entire line of Industrial steam and electrically operated wreckers from 75 to 200 ton capacities for railroad operation and heavy construction work. Section 4 covers special railroad equipment. Section 5 illustrates and describes combination pile drivers and locomotive cranes, steam pile hammers and pile driving leads. Section 6 gives special foreign features and equipment made for export railroad and commercial trade.

Road-Building Machinery—The United Iron Works, Kansas City, Mo., has just issued catalog G. R.-19, dealing with its road-building machinery. The catalog describes the company's line of jaw crushers, crushing rolls and portable crushing plants in detail.

Speed Reduction Drives.—The W. A. Jones Foundry and Machine Co., Chicago, Ill., has announced an entirely new edition of its catalog No. 26. It is made up of information of value to consulting engineers, superintendents, chief engineers, master mechanics—to any one who specifies mechanical drives for factories, mills, or plants. "In preparing this new edition," says the company, "our intention was to make it the standard work of its kind. The installation section presents pictorialy reducer drives in many large industrial plants." Dimensions, weights and horsepower ratings for complete speed reduction sets are shown.

Electric Hoists—Catalog 23E of the Detroit Hoist and Machine Co., Detroit, Mich., shows many of the standard designs and special applications of hoists, monorails, cranes and winches, and has numerous illustrations of the electric hoists, drums, motors and controllers and their applications to the industries.

Air Compressors and Vacuum Pumps—Form No. 104 of the Pennsylvania Pump and Compressor Co., Faston, Pa., contains 32 pages of material describing and illustrating this company's compressors and pumps. They are, it is stated, "built to satisfy the requirements of that discriminating class of buyers who desire the highest quality of product. Of pleasing design and rugged strength, no effort has been spared to embody in their construction every desirable feature that long experience in the design and manufacture of air compressors could suggest. In them are to be found no radical or untried features; they are well designed and well built and there have been incorporated in them the best engineering practices throughout."

Upkeep Cost Record Book—Vice-President Arthur C. Vicary of the Erie Steam Shovel Co., Erie, Pa., has compiled, within very attractive covers, the reasons for having the company's recent cost contest; its object and the method of making awards. "First of all," says Mr. Vicary, "we wanted to perform a worth-while service to users of steam shovels by getting together many actual maintenance records; to make this data available in handy form for shovel owners, so that an owner can quickly see just what the difference in shovel costs amounts to on different kinds of work. Our second reason was to prove definitely a statement we have often heard made by users—that our shovels and cranes cost about one-third as much to keep up as other machines used on the same work, and maintained on an equal basis. We felt that if this statement could be checked by hundreds of actual records, it would be of vital interest to all steam shovel users." The method used to rate the contest entries is clearly explained. Pictures of the contestants, their equipment and accurate figures of the tests made together with other valuable matter, make this book most interesting to users of this type of equipment.

Induction Motors—In giving publicity to its Type AA Reliance induction motors for two- and three-phase alternating circuits, the Reliance Electric and Engineering Co., Cleveland, Ohio, has issued Bulletin No. 5018. This is a new line of alternating current motors which the company is manufacturing. The bulletin contains a clear and lucid description, with numerous illustrations, of how Type AA motors were designed, going into detail as to the stator and stator winding, the bearing brackets, bearings, rotor, outlet for conduit connections, its interchangeability, the starting equipment, engineering service, etc. A table of ratings is also included as well as general outline dimensions of the motor.

Grab Bucket Cranes—The Pawling & Harnischfeger Co., of Milwaukee, Wis., have just issued a new bulletin, No. 305, covering their complete line of traveling grab bucket cranes and monorail hoists. This bulletin has 32 pages and is liberally illustrated. There are pictures of the various kinds of grab-bucket equipment and also many installation views showing the application in the industries.

Buyers' Directory
of the Rock Products Industry

Classified Directory of Advertisers in this issue of Rock Products

Air Compressors
Pennsylvania Pump & Compressor Co., Easton, Pa.
Smokeless Oil Burner Co., Bucyrus, Ohio
Worthington Pump & Mchy. Corp., New York

Air Separators
Rubert M. Gay Co., New York, N. Y.
Raymond Bros. Impact Pulv. Co., Chicago, Ill.
Sturtevant Mill Co., Boston, Mass.
Universal Road Mchy. Co., Kingston, N. Y.

Augers
Howells Mining Drill Co., Plymouth, Pa.

Automatic Weighers
Schaffer Eng. & Equip. Co., Pittsburgh, Pa.

Babbitt Metal
Ajax Metal Co., Philadelphia, Pa.

Bags and Bagging Machinery
Jaite Co., Jaite, Ohio
Valve Bag Co. of America, Toledo, Ohio

Balls (Tube Mill, etc.)
Hadfield-Penfield Steel Co., Bucyrus, Ohio
Worthington Pump & Mchy. Corp., New York

Belting
New York Belting & Packing Co., New York City

Belt Fasteners and Hooks
Crescent Belt Fastener Co., New York City

Belt Lacing and Rivets
Crescent Belt Fastener Co., New York City

Bins and Bin Gates
Austin-Western Road Machinery Co., Chicago, Ill.
Smith Engineering Works, Milwaukee, Wis.
W. Toepfer & Sons Co., Milwaukee, Wis.
Webster Mfg. Co., Chicago, Ill.
Weller Mfg. Co., Chicago, Ill.

Boiler Insulation
Celite Products Co., Chicago, Ill.

Boilers (Return and Water Tube)
Jackson & Church Co., Saginaw, Mich.

Box Car Loaders
Ottumwa Box Car Loader Co., Ottumwa, Iowa

Brick Machinery
Hadfield-Penfield Steel Co., Bucyrus, Ohio
Jackson & Church Co., Saginaw, Mich.
Shope Brick Co., Portland, Ore.

Buckets (Elevator and Conveyor)
American Manganese Steel Co., Chicago Heights, Ill.
H. W. Caldwell & Son Co., Chicago, Ill.
Hendrick Mfg. Co., Carbondale, Pa.
H. W. Caldwell & Son Co., Chicago, Ill.
Jeffrey Mfg. Co., Columbus, Ohio
Smith Engineering Works, Milwaukee, Wis.
W. Toepfer & Sons Co., Milwaukee, Wis.
Webster Mfg. Co., Chicago, Ill.
Weller Mfg. Co., Chicago, Ill.

Buckets (Grab, Clamshell, etc.)
Browning Co., Cleveland, Ohio
Industrial Works, Bay City, Mich.
McMyler Interstate Co., Cleveland, Ohio
Orton & Steinbrenner, Chicago, Ill.
Penn Fdy. & Mach. Co., Reading, Pa.

Burr Mills
J. B. Ehrsam & Sons, Mfg. Co., Enterprise, Kan.

Cableways
Interstate Equipment Corp., New York, N. Y.

Calcining Kettles (Gypsum)
American Process Co., New York, N. Y.
J. B. Ehrsam & Sons Mfg. Co., Enterprise, Kan.

Car Pullers
H. W. Caldwell & Son Co., Chicago, Ill.
Ottumwa Box Car Loader Co., Ottumwa, Iowa
Thomas Elevator Co., Chicago, Ill.
Weller Mfg. Co., Chicago, Ill.

Cars (Quarry)
Koppel Ind. Car & Equipment Co., Koppel, Pa.
Penn Fdy. & Mach. Co., Reading, Pa.

Chain (Steam Shovel)
Carroll Chain Co., Columbus, Ohio

Chain Drives
H. W. Caldwell & Son Co., Chicago, Ill.
Morse Chain Co., Ithaca, N. Y.

Clutches
H. W. Caldwell & Son Co., Chicago, Ill.

Coal Pulverizing Equipment
Fuller-Lehigh Co., Fullerton, Pa.
Rubert M. Gay Co., New York, N. Y.
Pennsylvania Crusher Co., Philadelphia, Pa.
Raymond Bros. Impact Pulv. Co., Chicago, Ill.

Conveyors and Elevators
Austin-Western Road Machinery Co., Chicago, Ill.
H. W. Caldwell & Son Co., Chicago, Ill.
Jeffrey Mfg. Co., Columbus, Ohio
Kennedy-Van Saun Mfg. & Engineering Corp., New York City
Link-Belt Co., Chicago, Ill.
Schaffer Eng. & Equip. Co., Pittsburgh, Pa.
Smith Engineering Works, Milwaukee, Wis.
Sturtevant Mill Co., Boston, Mass.
W. Toepfer & Sons Co., Milwaukee, Wis.
Universal Crusher Co., Cedar Rapids, Iowa
Universal Road Mchy. Co., Kingston, N. Y.

Couplings
Knox Mfg. Co., Philadelphia, Pa.

Cranes (Crawler)
Byers Machine Co., Ravenna, Ohio
Erie Steam Shovel Co., Erie, Pa.
Industrial Works, Bay City, Mich.
Link-Belt Co., Chicago, Ill.
Marion Steam Shovel Co., Marion, Ohio
McMyler Interstate Co., Cleveland, Ohio
Northwest Engineering Co., Chicago, Ill.
Orton & Steinbrenner Co., Chicago, Ill.
Osgood Co., Marion, Ohio
Thew Shovel Co., Lorain, Ohio

Cranes (Locomotive)
American Hoist & Derrick Co., St. Paul, Minn.
Browning Co., Cleveland, Ohio
Byers Machine Co., Ravenna, Ohio
Erie Steam Shovel Co., Erie, Pa.
Industrial Works, Bay City, Mich.
McMyler Interstate Co., Cleveland, Ohio
Northwest Engineering Co., Chicago, Ill.
Ohio Locomotive Crane Co., Bucyrus, Ohio
Orton & Steinbrenner, Chicago, Ill.
Osgood Co., Marion, Ohio
Thew Shovel Co., Lorain, Ohio

Cranes (Overhead Electric Traveling)
Morgan Engineering Co., Alliance, Ohio

Crushers (Hammer)
Jeffrey Mfg. Co., Columbus, Ohio
Pennsylvania Crusher Co., Philadelphia, Pa.

Crushers (Jaw and Gyratory)
Allis-Chalmers Mfg. Co., Milwaukee, Wis.
Austin-Western Road Machinery Co., Chicago, Ill.
Earle C. Bacon, Inc., New York, N. Y.
C. G. Buchanan Co., New York City
J. B. Ehrsam & Sons Mfg. Co., Enterprise, Kan.
Rubert M. Gay Co., New York, N. Y.
Kennedy-Van Saun Mfg. & Engineering Corp., New York City.
Morgan Engineering Co., Alliance, Ohio
New Holland Machine Co., New Holland, Pa.
Pennsylvania Crusher Co., Philadelphia, Pa.
Smith Engineering Works, Milwaukee, Wis.
Sturtevant Mill Co., Boston, Mass.
Traylor Eng. & Mfg. Co., Allentown, Pa.
Universal Crusher Co., Cedar Rapids, Iowa
Universal Road Mchy. Co., Kingston, N. Y.
Webb City & Carterville Fdy. & Mch. Works, Webb City, Mo. (Jaw)
Worthington Pump & Mchy. Corp., New York

Crushing Rolls
C. G. Buchanan Co., New York City
Kennedy-Van Saun Mfg. & Engineering Corp., New York
McLanahan Stone Mach. Co., Hollidaysburg, Pa.
New Holland Machine Co., New Holland, Pa.
Sturtevant Mill Co., Boston, Mass.
Traylor Eng. & Mfg. Co., Allentown, Pa.
Webb City & Carterville Fdy. & Mch. Works, Webb City, Mo.
Worthington Pump & Mchy. Corp., New York

Derricks
McMyler Interstate Co., Cleveland, Ohio
Thomas Elevator Co., Chicago, Ill.

Dippers and Teeth (Steam Shovel)
American Manganese Steel Co., Chicago Heights, Ill.
Marion Steam Shovel Co., Marion, Ohio
Thew Shovel Co., Lorain, Ohio

Draglines
Erie Steam Shovel Co., Erie, Pa.
Marion Steam Shovel Co., Marion, Ohio
McMyler Interstate Co., Cleveland, Ohio
Northwest Engineering Co., Chicago, Ill.
Orton & Steinbrenner Co., Chicago, Ill.
Osgood Co., Marion, Ohio

Dragline Cableway Excavators
Browning Co., Cleveland, Ohio
Sauerman Bros., Chicago, Ill.
Thomas Elevator Co., Chicago, Ill.

Dredge Chain
Carroll Chain Co., Columbus, Ohio

Dredges (Hydraulic)
Ellicott Machine Corp., Baltimore, Md.

Dredges (Sand and Gravel)
American Manganese Steel Co., Chicago Heights, Ill.
Ellicott Machine Corp., Baltimore, Md.
Marion Steam Shovel Co., Marion, Ohio
McMyler Interstate Co., Cleveland, Ohio
Morris Machine Works, Baldwinsville, N. Y.
Thomas Elevator Co., Chicago, Ill.

Drills (Air and Electric)
Howells Mining Drill Co., Plymouth, Pa.

Drills (Blast Hole)
Howells Mining Drill Co., Plymouth, Pa.
Sanderson-Cyclone Drill Co., Orrville, Ohio

Drills (Hand)
Howells Mining Drill Co., Plymouth, Pa.

Drill Steel
Colonial Steel Co., Pittsburgh, Pa.

Dryers
Allis-Chalmers Mfg. Co., Milwaukee, Wis.
American Process Co., New York, N. Y.
Buckeye Dryer Co., Chicago, Ill.
Hadfield-Penfield Steel Co., Bucyrus, Ohio
Kennedy-Van Saun Mfg. & Engineering Corp., New York, N. Y.
Traylor Eng. & Mfg. Co., Allentown, Pa.
Vulcan Iron Works, Wilkes-Barre, Pa.

Engineers
Glamorgan Pipe & Fdy. Co., Lynchburg, Va.
Robt. W. Hunt Co., Chicago, Ill.
Kritzer Co., Chicago, Ill.
Richard K. Meade & Co., Baltimore, Md.
H. Miscampbell, Duluth, Minn.
Schaffer Eng. & Equip. Co., Pittsburgh, Pa.
F. L. Smidth & Co., New York, N. Y.
Traylor Eng. & Mfg. Co., Allentown, Pa.

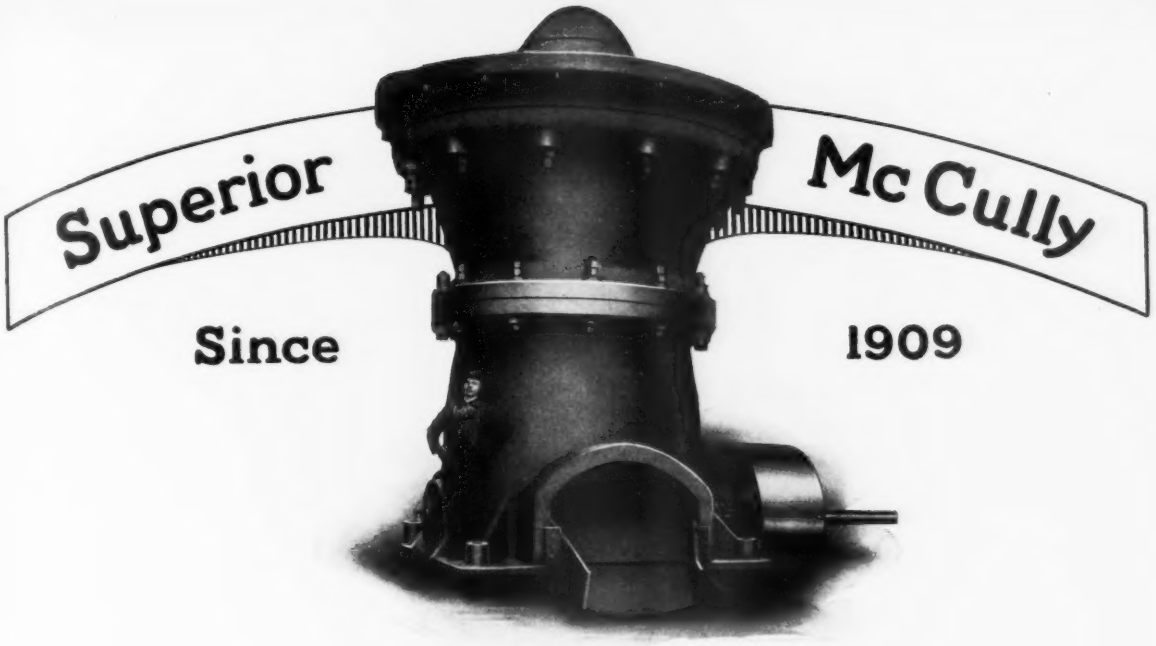
Engines (Gasoline, Kerosene and Oil)
American Hoist & Derrick Co., St. Paul, Minn.
Climax Engineering Co., Clinton, Iowa.
Worthington Pump & Mchy. Corp., New York

Engines (Steam)
American Hoist & Derrick Co., St. Paul, Minn.
Ellicott Machine Corp., Baltimore, Md.
Jackson & Church Co., Saginaw, Mich.
Morris Machine Works, Baldwinsville, N. Y.

Frogs and Switches
Central Frog & Switch Co., Cincinnati, Ohio

Fuses (Detonating and Safety)
Ensign-Bickford Co., Simsbury, Conn.

Gas Producers
Chowning Regulator Corp., Corning, N. Y.
Glamorgan Pipe & Fdy. Co., Lynchburg, Va.
Morgan Construction Co., Worcester, Mass.



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The Original Superior McCully

In 1909 Worthington built the first short shaft gyratory called the Superior McCully Crusher as distinguished from the standard McCully. Thus the present style of gyratory crusher built at the Power and Mining Works of the Worthington Pump and Machinery Corporation has a background of fourteen years.

WORTHINGTON PUMP AND MACHINERY CORPORATION
Executive Offices: 115 Broadway, New York City. Branch Offices in 24 Large Cities

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Deane Works, *Holyoke, Mass.*
Blake & Knowles Works
East Cambridge, Mass.
Worthington Works
Harrison, N. J.
Laidlaw Works, *Cincinnati, Ohio.*

Gas Engine Works, *Cudahy, Wis.*
Power & Mining Works
Cudahy, Wis.
Snow-Holly Works
Buffalo, N. Y.

Buyers' Directory
of the Rock Products Industry

Classified Directory of Advertisers in this issue of Rock Products

Gas Producer Regulators
Chowning Regulator Corp., Corning, N. Y.

Gears (Spur, Helical, Worm)
H. W. Caldwell & Son Co., Chicago, Ill.
Link-Belt Co., Chicago, Ill.

Grizzlies
Robins Conveying Belt Co., New York City
W. Toepfer & Sons Co., Milwaukee, Wis.
Traylor Eng. & Mfg. Co., Allentown, Pa.

Gypsum Plaster Plants
J. B. Ehrsam & Sons Mfg. Co., Enterprise, Kans.

Hoists
American Hoist & Derrick Co., St. Paul, Minn.
Hyman-Michaels Co., Chicago, Ill.
Industrial Works, Bay City, Mich.
Jackson & Church Co., Saginaw, Mich.
Link-Belt Co., Chicago, Ill.
Thomas Elevator Co., Chicago, Ill.
Vulcan Iron Works, Wilkes-Barre, Pa.
Weller Mfg. Co., Chicago, Ill.

Hose (Water, Steam, Air Drill)
New York Belting & Packing Co., New York City

Hydrators (Lime)
Kritzer Co., Chicago, Ill.
Richard K. Meade & Co., Baltimore, Md.
H. Miscampbell, Duluth, Minn.
Schaffer Eng. & Equip. Co., Pittsburgh, Pa.

Insulation (Heat)
Celite Products Co., Chicago, Ill.

Kilns (Rotary)
Allis-Chalmers Mfg. Co., Milwaukee, Wis.
Kennedy-Van Saun Mfg. & Engineering Corp., New York City
H. Miscampbell, Duluth, Minn.
Traylor Eng. & Mfg. Co., Allentown, Pa.
Vulcan Iron Works, Wilkes-Barre, Pa.

Kilns (Shaft)
H. Miscampbell, Duluth, Minn.
Schaffer Eng. & Equip. Co., Pittsburgh, Pa.

Lime Handling Equipment
H. W. Caldwell & Son, Chicago, Ill.
Kritzer Co., Chicago, Ill.
Link-Belt Co., Chicago, Ill.
H. Miscampbell, Duluth, Minn.
Raymond Bros. Impact Pulv. Co., Chicago, Ill.
Schaffer Eng. & Equip. Co., Pittsburgh, Pa.
Sturtevant Mill Co., Boston, Mass.
Webster Mfg. Co., Chicago, Ill.

Lime Kilns
Glamorgan Pipe & Fdy. Co., Lynchburg, Va.

Liquid Fuel Equipment
W. N. Best Furnace & Burner Corp., New York City

Loaders and Unloaders
Hoar Shovel Co., Duluth, Minn.
Jeffrey Mfg. Co., Columbus, Ohio
Link-Belt Co., Chicago, Ill.
Marion Steam Shovel Co., Marion, Ohio
McMyler Interstate Co., Cleveland, Ohio
Northwest Engineering Co., Chicago, Ill.
Ottumwa Box Car Loader Co., Ottumwa, Iowa

Locomotives (Steam, Gas and Elec.)
Baldwin Loco. Wks., Phila., Pa. (Steam)
Davenport Locomotive Works, Davenport, Iowa (Steam, Gas)
Fate-Root-Heath Co., Plymouth, Ohio (Gas)
Ironton Eng. Co., Ironton, Ohio (Elec.)
Jeffrey Mfg. Co., Columbus, Ohio (elec.)
Lima Locomotive Works, Lima, Ohio (Steam)
Milwaukee Loco. Mfg. Co., Milwaukee, Wis. (Gas)
H. K. Porter Co., Pittsburgh, Pa. (Steam)
Vulcan Iron Works, Wilkes-Barre, Pa. (Steam)

Lubricating Systems
Keystone Lubricating Co., Philadelphia, Pa.
Ottumwa Box Car Loader Co., Ottumwa, Iowa

Manganese Steel (Castings, Repairs, etc.)
American Manganese Steel Co., Chicago Heights, Ill.
Hadfield-Penfield Steel Co., Bucyrus, Ohio

Magnetic Devices
Magnetic Mfg. Co., Milwaukee, Wis.

Mills, Grinding (Ball, Tube, etc.)
Allis-Chalmers Mfg. Co., Milwaukee, Wis.
Jackson & Church Co., Saginaw, Mich.
Raymond Bros. Impact Pulv. Co., Chicago, Ill.
F. L. Smidth & Co., New York, N. Y.
Sturtevant Mill Co., Boston, Mass.
Traylor Eng. & Mfg. Co., Allentown, Pa.
Worthington Pump & Mchy. Corp., New York

Motors and Generators
Burke Electric Co., Erie, Pa.
General Electric Co., Schenectady, N. Y.

Oil Burners and Systems
Smokeless Oil Burner Co., Bucyrus, Ohio

Packing (Pump Valves, etc.)
New York Belting & Packing Co., New York City

Perforated Metal
Cross Engineering Co., Carbondale, Pa.
Hendrick Mfg. Co., Carbondale, Pa.
W. Toepfer & Sons Co., Milwaukee, Wis.

Portable Conveyors
Jeffrey Mfg. Co., Columbus, Ohio

Portable Engines
Climax Engineering Co., Clinton, Iowa

Power Units
Climax Engineering Co., Clinton, Iowa

Pulverizers
Bradley Pulverizer Co., Allentown, Pa.
Fuller-Lehigh Co., Fullerton, Pa.
Jeffrey Mfg. Co., Columbus, Ohio
K-B Pulverizer Co., Inc., New York City
Raymond Bros. Impact Pulv. Co., Chicago, Ill.
Sturtevant Mill Co., Boston, Mass.
Universal Crusher Co., Cedar Rapids, Iowa

Pumps (Sand and Gravel)
Allis-Chalmers Mfg. Co., Milwaukee, Wis.
American Manganese Steel Co., Chicago Heights, Ill.
Ellicott Machine Corp., Baltimore, Md.
Morris Machine Works, Baldwinsville, N. Y.

Pumps (Water, etc.)
Morris Machine Works, Baldwinsville, N. Y.
Pennsylvania Pump & Compressor Co., Easton, Pa.
Smokeless Oil Burner Co., Bucyrus, Ohio
Webb City & Carterville Fdy. & Mch. Works, Webb City, Mo.
Worthington Pump & Mchy. Corp., New York

Road Machinery
Austin-Western Road Machinery Co., Chicago, Ill.
Hadfield-Penfield Steel Co., Bucyrus, Ohio
Marion Steam Shovel Co., Marion, Ohio
Northwest Engineering Co., Chicago, Ill.
Orton & Steinbrenner Co., Chicago, Ill.
Universal Road Mchy. Co., Kingston, N. Y.

Scrapers (Drag, etc.)
Austin-Western Road Machinery Co., Chicago, Ill.
Northwest Engineering Co., Chicago, Ill.
Thomas Elevator Co., Chicago, Ill.

Screens
Austin-Western Road Machinery Co., Chicago, Ill.
Earle C. Bacon Co., New York, N. Y.
Cross Engineering Co., Carbondale, Pa.
Rubert M. Gay Co., New York, N. Y.
Harrington & King Perforating Co., Chicago, Ill.
Hendrick Mfg. Co., Carbondale, Pa.
Kennedy-Van Saun Mfg. & Engineering Corp., New York City
Link-Belt Co., Chicago, Ill.
McLanahan Stone Mach. Co., Hollidaysburg, Pa.
Newark Wire Cloth Co., Newark, N. J.
Robins Conveying Belt Co., New York City
Smith Engineering Works, Milwaukee, Wis.
Sturtevant Mill Co., Boston, Mass.
W. Toepfer & Sons Co., Milwaukee, Wis.
Traylor Eng. & Mfg. Co., Allentown, Pa.
W. S. Tyler Co., Cleveland, Ohio
Universal Crusher Co., Cedar Rapids, Iowa
Weller Mfg. Co., Chicago, Ill.

Screens (Electric Vibrating)
W. S. Tyler Co., Cleveland, Ohio

Separators (Magnetic)
Magnetic Mfg. Co., Milwaukee, Wis.

Shafting
H. W. Caldwell & Son, Chicago, Ill.

Shovels (Steam, Gas and Electric)
Browning Co., Cleveland, Ohio
Erie Steam Shovel Co., Erie, Pa.
Hoar Shovel Co., Duluth, Minn.
Marion Steam Shovel Co., Marion, Ohio
McMyler Interstate Co., Cleveland, Ohio
Northwest Engineering Co., Chicago, Ill.
Orton & Steinbrenner Co., Chicago, Ill.
Osgood Co., Marion, Ohio
Thew Shovel Co., Lorain, Ohio

Sprockets and Chain
American Manganese Steel Co., Chicago Hts, Ill.
H. W. Caldwell & Son Co., Chicago, Ill.
Jeffrey Mfg. Co., Columbus, Ohio

Steel Plate Construction
Glamorgan Pipe & Fdy. Co., Lynchburg, Va.
Hendrick Mfg. Co., Carbondale, Pa.
Jackson & Church Co., Saginaw, Mich.

Testing Sieves and Shakers
Newark Wire Cloth Co., Newark, N. J.
W. S. Tyler Co., Cleveland, Ohio

Tool Steel
Colonial Steel Co., Pittsburgh, Pa.

Track Equipment
Central Frog & Switch Co., Cincinnati, Ohio

Tramways (Aerial Wire Rope)
Interstate Equipment Corp., New York City
A. Leschen & Sons Rope Co., St. Louis, Mo.

Transmission Machinery
H. W. Caldwell & Son Co., Chicago, Ill.
Kritzer Co., Chicago, Ill.
Link-Belt Co., Chicago, Ill.
Webster Mfg. Co., Chicago, Ill.
Weller Mfg. Co., Chicago, Ill.

Underground Loaders
Hoar Shovel Co., Duluth, Minn.

Valves (Throttle)
Knox Mfg. Co., Philadelphia, Pa.

Washers (Sand, Gravel and Stone)
Allis-Chalmers Mfg. Co., Milwaukee, Wis.
McLanahan Stone Mach. Co., Hollidaysburg, Pa.
Smith Engineering Works, Milwaukee, Wis.

Weighing Equipment
Schaffer Eng. & Equip. Co., Pittsburgh, Pa.

Welding Equipment
Burke Electric Co., Erie, Pa.

Wire Cloth
W. S. Tyler Co., Cleveland, Ohio

Wire Rope
A. Leschen & Sons Co., St. Louis, Mo.

Classified Advertising

Rates for advertising in the Classified Department: $2.50 per column inch per insertion. Minimum charge, $2.50. Type ads only. No cuts or illustrations permitted unless at the regular display advertising rates. Please send check with order. These ads must be paid for in advance of insertion

ATTENTION!

New Industry for Gypsum Manufacturers and Gypsum Quarries-Owners

(American Patent)

We desire to negotiate with gypsum manufacturers and gypsum-quarries-owners, with a view to introduce an entirely new industry in America, for which very large quantities of gypsum will be required. For detailed information apply to

FRANK G. ORR & CO.

17 Blythswood Square Glasgow, Scotland

POSITION WANTED

A production man desires to make a connection where results will determine his value. Experience includes lime, paper pulp and heavy chemicals, as chief chemist, superintendent and works manager. Thoroughly familiar with all crushing and kilning machinery. Age 39, married, Christian. Available September. Address

Box 1698, care of Rock Products
542 South Dearborn St., Chicago, Illinois

Position Wanted

Thoroughly experienced operator wishes to become connected permanently with large reliable firm quarrying and crushing, either hard or soft rock. Location immaterial. Permanency with future main essential. Address

Box 1695, Care of Rock Products
542 South Dearborn Street, Chicago, Illinois

WANTED

First class man for motor transmission and grinding machine, to oversee all running machines. Address

Box 1697, care Rock Products
542 South Dearborn St., Chicago, Illinois

Experienced Manager

Open pit or underground quarry superintendent or manager open for employment August 1. Fifteen years' experience. Best references. Nominal salary with share in profits produced.

Address Box 1678, care of Rock Products
542 South Dearborn Street Chicago, Illinois

Graduate M. E. with thorough experience in construction, operation and industrial management. Able to design, erect, train operators and install an efficient system in a rotary kiln hydrate plant. Desires position as general manager in charge of engineering in cement or lime plant.

Address Box 1692, care Rock Products
542 South Dearborn Street Chicago, Illinois

Competent and Energetic Supt.

open for position. Knowledge of the business gained from actual experience in personally handling plant and quarry work in detail. Thoroughly familiar with installation, operation and maintenance of crushing and quarrying machinery and with development of plants and quarries. Can assure efficient and economical operation. Willing to locate anywhere if future prospects favorable. Address

Box 1673, Care of Rock Products
542 South Dearborn Street Chicago, Ill.

FOR SALE

8—6x115-ft. Vulcan Rotary Kilns; condition A-1; unused.
3—4x23-ft. Hersey Dryers.

Address
Box 1700, Care of Rock Products
542 South Dearborn Street, Chicago, Ill.

For Sale or Long Term Lease:

Twenty acre limestone quarry located with 1300 foot siding locally on the Lehigh Valley Railroad in eastern Pennsylvania. Quarry is 800 feet long and 70 feet high and has been worked on fluxing more than ten years. Stone is approved by the Pennsylvania and New Jersey state highway departments for commercial purposes. Can reach 15 blast furnaces on freight rates under 90 cents per ton. Rates established for commercial stone over four main line railroads. Stripping averages only 18 inches with one year's work completed. Stone runs very high in lime and under 2 per cent silica. No shipping competition on Lehigh Valley within radius of 80 miles. Price $12,000, with part on time.

Write Box 135, Allentown, Pa.

FOR SALE

No. 20 Traylor Bulldog Gyratory Crusher
7½D—Gates Gyratory Crusher
No. 10 McCully Gyratory Crusher
48"x20' Revolving Manganese Screen.

ARTHUR S. PARTRIDGE
415 Pine St. Louis

WANTED

Superintendent for large rock drying and grinding plant in South. Prefer mechanical engineer experienced in operation of modern drying equipment. Apply with full particulars.

Box 1694, Care of Rock Products
542 South Dearborn Street Chicago, Ill.

POSITION WANTED

as General Superintendent, Operating Engineer or Plant Manager of Sand and Gravel operation. Age 36, married, technically educated; 15 years' experience mine, quarry, sand and gravel. Conversant with modern methods and alive to necessity of volume production. Address

Box 1696, Care of Rock Products
542 South Dearborn Street, Chicago, Illinois

FOR SALE

High grade argillaceous limestone deposit in commercial quantities in central Illinois. No competition.

Address Box 1686, Care of Rock Products
542 So. Dearborn St., Chicago, Ill.

Used Equipment

Rates for advertising in the Used Equipment Department: $2.50 per column inch per insertion. Minimum charge, $2.50. Type ads only. No cuts or illustrations permitted unless at the regular display advertising rates. Please send check with order. These ads must be paid for in advance of insertion

FOR SALE

We have sufficient 8-foot shell, in five pieces, to make 150-foot Rotary Kiln, 4 steel tires, and 4 sets of Carrying Rolls, but no Driving Mechanism. If you so desire we can send you detailed description of this Equipment.

1—No. 10 Allis-Chalmers Gyratory Crusher, Manganese Fitted.

3—No. 6 McCully Gyratory Crushers, Manganese Fitted.
2—No. 5 Allis-Chalmers Gyratory Crushers.

THE EQUIPMENT SALES COMPANY
R. W. Storrs, Jr., Manager
Nashville — *Wire us your requirements at our expense. "If we don't have it, we will get it."* — Tennessee

ROTARY DRYERS

30 New Direct-Fired Rotary Dryers, 4'-0" diam., 30'-0" long. These Dryers were about to be put into operation as the armistice was signed, and consequently were never used. We are offering them at a sacrifice, complete with driving mechanism, furnace irons, grates, etc. Some are equipped with steam radiators, for steam heated air drying.

McDERMOTT BROS. CO.
Allentown, Penna.

SPECIAL BARGAINS

Send Us Your Boiler Inquiries

66x86 in. TRAYLOR JAW CRUSHING PLANT.
25-50-80-110 HP. Elec. Hoists.
Nos. 4-5-6-7½-9 and 10 CRUSHERS.
6 and 10 ton Gasoline Locomotives.
2-DISC CRUSHERS, 24, 28 and 36 in.
100 TON 2½ yd. ELECTRIC SHOVEL.
50-5000 ft. Steam Belt and Electric Compressors.
13x30 in.; 10x18 in.; 8x14 in. JAW CRUSHERS.
24x54 McLANAHAN ROLL CRUSHERS.
50 HP. D. D. HOIST, 440 V. 3 Ph. Motor Dragline Set: Also 25 HP. Dragline Equip.
150 HP. LOCO. TYPE BOILER, 125 lb.
3 60-HP. GASOLENE 5-D HOISTS, PRAC. NEW.
10 and 12 ton ROAD ROLLERS.
5-7½ and 10 HP. PORTABLE CONVEYORS.
750-1000 GPM. UNDERWRITERS STEAM PUMPS.
NEW No. 5 GYRATORY CRUSHER (MICHIGAN).

Send Us Your Inquiries for Your Wants

ROSS POWER EQUIP. COMPANY
Indianapolis, Ind.

WANTED

Wood-fiber machine for cutting wood-fiber for plaster. Give complete specifications and state condition of machine and price.

Box 1699, care of Rock Products
542 South Dearborn St., Chicago, Illinois

FOR SALE

One size "B" Chicago Giant Steam Rock Drill complete with tripod, set of steels, and two 50 ft. length of 1-in. hose with couplings. Has been used one week in shale rock. Price $300.00.

The Standard Sand & Machine Co.
5151 St. Clair Ave., Cleveland, Ohio

WANTED

1—½ yd. Dragline Bucket.

Breen Stone & Marble Co.
Kasota, Minn.

Mine Cars, Rails and Locomotives

We have a number of good, serviceable, standard gauge, second hand locomotives, and narrow gauged ones, for immediate shipment.

M. K. FRANK
Frick Building — Pittsburgh, Pa.

FOR SALE

4000 lin. ft., 30-in., 20 lb. Track
12 30-in., 1½-yd. Cars
PLYMOUTH GASOLINE LOCOMOTIVE

F. WILLIAM STOCKER
Hoboken, N. J.

1—50-ton standard gauge Brooks 6-wheel switcher.
1—28-ton standard gauge Shay geared locomotive.
2—10x16" 36" gauge 4-wheel saddle tank locomotives.
2—9x14" 36" gauge 4-wheel saddle tank locomotives.
1—14-B Bucyrus steam shovel, mounted on traction wheels.
2—18-ton O&S bucket handling locomotive cranes.
10 Miles 30-lb. and 35-lb. relay steel rails, Natalbany, La.

Birmingham Rail and Locomotive Co.
Birmingham, Ala.

FOR SALE

1—6K Gates Crusher
1—4B Gates Crusher
15—4½ to 5 ton steel body, end dump, heavy duty standard gauge quarry cars, new, 1922
1—Switching Locomotive, standard gauge
1—70 ton Steam Shovel, 2½ yd. bucket
Will sell any or all at very low prices

Inland Crushed Stone Co.
105 North Clark St. — Chicago, Ill.

FOR SALE

Machinery for making slack wood barrels, 16x28-inch, with steel hoops, stave crozier, barrel shaper with extra cage—hoop riveter—hoop expander—10-HP. Williamsport gas engine.

American Lime & Stone Company
Bellefonte, Pennsylvania

FOR SALE

One new 6 ft. x 6 ft. x 10 ft. Patch Gang Saw, complete with pump.

Address Box 1677, care of Rock Products
542 South Dearborn St., Chicago, Illinois

FOR SALE

Plymouth Gasoline Locomotive, 24" gauge, Model AL No. 326, in very good condition. Inquire of

THE SMALLWOOD-LOW STONE CO.
Lisbon, Ohio

Used Equipment

Rates for advertising in the Used Equipment Department: $2.50 per column inch per insertion. Minimum charge, $2.50. Type ads only. No cuts or illustrations permitted unless at the regular display advertising rates. Please send check with order. These ads must be paid for in advance of insertion

FOR SALE

5 5x6x7x110′ Rotary KILNS.
5 5x21′ Tube Mills (1 has Silax Lining, 3 Steel Lining, 1 without Lining).
2 No. 8 Ball Mills.
1 4x40′ Coal Dryer.
1 No. 6 Gates Crusher.
2 5½x22′ Smidth Tube Mills.
2 No. 66 Smidth Kominuters.
2 6x60′ Rotary Dryers.
1 Lathe, 26″ Swing, 16′ Bed.
2 Automatic Weighing Machines.
3 Roll Leather Belting, 3-ply, 46″x 242′. And lot of Miscellaneous Equipment.

ENGINEERING SALES COMPANY
Stockertown, Pa.

For Sale—STEAM SHOVEL

⅝ YD. THEW "O" TRACTION

Thoroughly rebuilt; attractive terms for quick sale.

Walter A. Zelnicker Supply Co., St. Louis
Rails, Locomotives, Cars, Tanks, Pipe

For Sale—Steam Shovels

1—70 C. Bucyrus, 2½ yd. Bucket.
1—60 Marion, 2½ yd. Bucket.
Both standard gauge. Immediate shipment.

Consolidated Products Co., Inc.
15 Park Row New York, N. Y.

Machinery For Sale

DRYERS—Direct-heat rotary dryers, 3x25′, 3½x25′, 4x30′, 5½x50′, 6x60′ and 7x60′; double shell dryers, 4x20′, 5x30′ and 6x35′; steam-heated air rotary dryers, 4x30′ and 6x30′.

KILNS—Rotary kilns, 4x40′, 5x50′ and 6x70′, 6x100′, 7x80′ and 8x110′.

MILLS—6x8′, 6x5′, 5x4′, 3x3½′ pebble and ball mills; 3′ March mill; 42″, 33″ and 24″ Fuller-Lehigh mills; 4½x20′, 5x11′, 5x20′, 5½x22′ and 6x20′ tube mills; 7½x13″, 9x15″, 16x10″ and 12x26″ jaw crushers; one "Infant" No. 00, No. 0, No. 2, No. 3, and No. 9 Williams' swing hammer mills; one Kent type "G" mill; 24″, 36″ and 40″ cage mills; 3′ and 4½′, 6′ and 8′ Hardinge mills; 18x12″, 20x12″ and 30x10″ roll crushers; No. 0, No. 1 and No. 3 Sturtevant rotary crushers; one No. 2 Sturtevant ring roll crusher; 3 roll and 2 roll No. 1 and No. 000, No. 00 and No. 0 Raymond mills; one No. 3 and No. 4 and No. 7½ Telsmith breaker; one 36″ Sturtevant emery mill; one 3 roll Griffin mill; 60″ chaser mill.

SPECIALS—Five automatic package weighing machines; jigs; 6x8′, 6x5′ and 4x3′ Newaygo vibrating screens; Richardson automatic scales; 8′ and 10′ Emerick air separators.
Air compressors.

W. P. Heineken, Engineer
95 Liberty Street, New York. Tel. Cortland 1841

Free Service to Readers of Rock Products

If you are in the market for any kind of machinery, equipment or supplies, or if you desire catalogs, information or prices on any product, we are at your service—to obtain for you, without expense, catalogs, prices or specific information on every kind of machinery, equipment and supplies—or to help you find the hard to find source of supply.

RESEARCH SERVICE DEPARTMENT

ROCK PRODUCTS, 542 So. Dearborn St., Chicago, Illinois

Please send me catalogs and prices concerning the following items:

.....

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Name.....

Address.....

City..... State.....

INDEX TO ADVERTISEMENTS

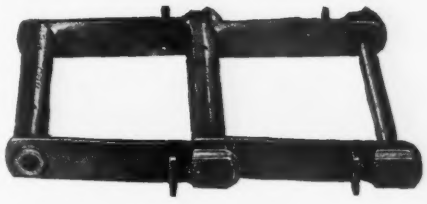
A Conveyor Chain For Every Need

When the day in and day out service of a conveyor is vital in keeping up production—then there is need for careful consideration in the selection of the type of chain to be used.

In building Brownhoist conveyors great care is taken in selecting the type of chain that is best fitted to the particular operating conditions. A complete stock of malleable iron and drop-forged chain makes this selection possible.

Brownhoist drop-forged chain is built up of I-beam section links with large upset ends. This design combines great strength and rigidity with light weight and assures long wear under the hardest handling conditions. This type of chain fills the need where loads are extra heavy and immunity from breakdowns is essential.

Brownhoist malleable iron chain is made of high grade materials to give great strength and long service at low cost. Where it is not practical or economical to use drop-forged chain, there is a type of malleable iron chain to fill the need.



Let us talk over your conveyor problems. Our long experience in the study of material handling will enable us to offer helpful suggestions and to recommend the most efficient application of Brownhoist chain to your requirements.

The Brown Hoisting Machinery Co., *Cleveland, Ohio*

Branch Offices: New York, Chicago, Pittsburgh, San Francisco, New Orleans

Products: Locomotive Cranes, Buckets, Belt and Chain Conveyors, Bunkers, Coal Crushers, Etc.

MATERIAL HANDLING EQUIPMENT

When writing advertisers please mention ROCK PRODUCTS

The Only Journal With a Paid Circulation in the Rock Products Industry

Rock Products

Entered as second-class matter, July 2, 1907, at the Chicago, Illinois, Postoffice, under the Act of March 3, 1879.

Published Every Other Saturday by

Tradepress Publishing Corporation

542 South Dearborn Street, Chicago, Illinois

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Volume 26 September 8, 1923 Number 18

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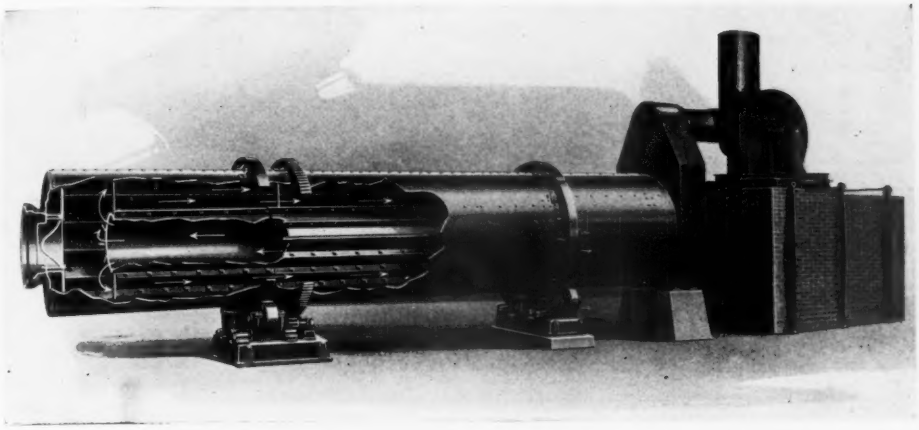


A Dryer that utilizes both conductive and convective heat

The two principal forms of heat for drying materials are used to advantage in the Ruggles-Coles double shell dryer.

The material upon entering the dryer drops to the outer shell, where it is picked up by lifter vanes, so designed, that in raising the material to be dried, it is dropped upon the hot inner shell where the moisture is driven off by conductive heat. Upon further rotation of the dryer, the material falls to the outer shell. Hot gases (convective heat), which are returning in the annular space between the inner and outer shell, carry away the moisture, now in the form of vapor.

There are 7 other types of Ruggles-Coles dryers, each operating on a principle that applies to specific requirements. These types were designed to take care of practically every commercial requirement.

RUGGLES-COLES ENGINEERING CO.
120 BROADWAY NEW YORK

"Ruggles-Coles" Dryers

WILLIAMSPORT WIRE ROPE

PATENTED TELFAX TAPE MARKED

Is Especially Adapted for Maximum Service on

THEW SHOVELS

—and the TELFAX system of marking each grade, by a colored tape woven into and throughout the hemp core, is a protection every operator should demand, for his own safety, as well as that of his employees.

Thew or any shovel company will be glad to supply Williamsport Telfax Marked Ropes on your equipment without additional charge if you request it.

It is standard equipment on some makes of shovels.

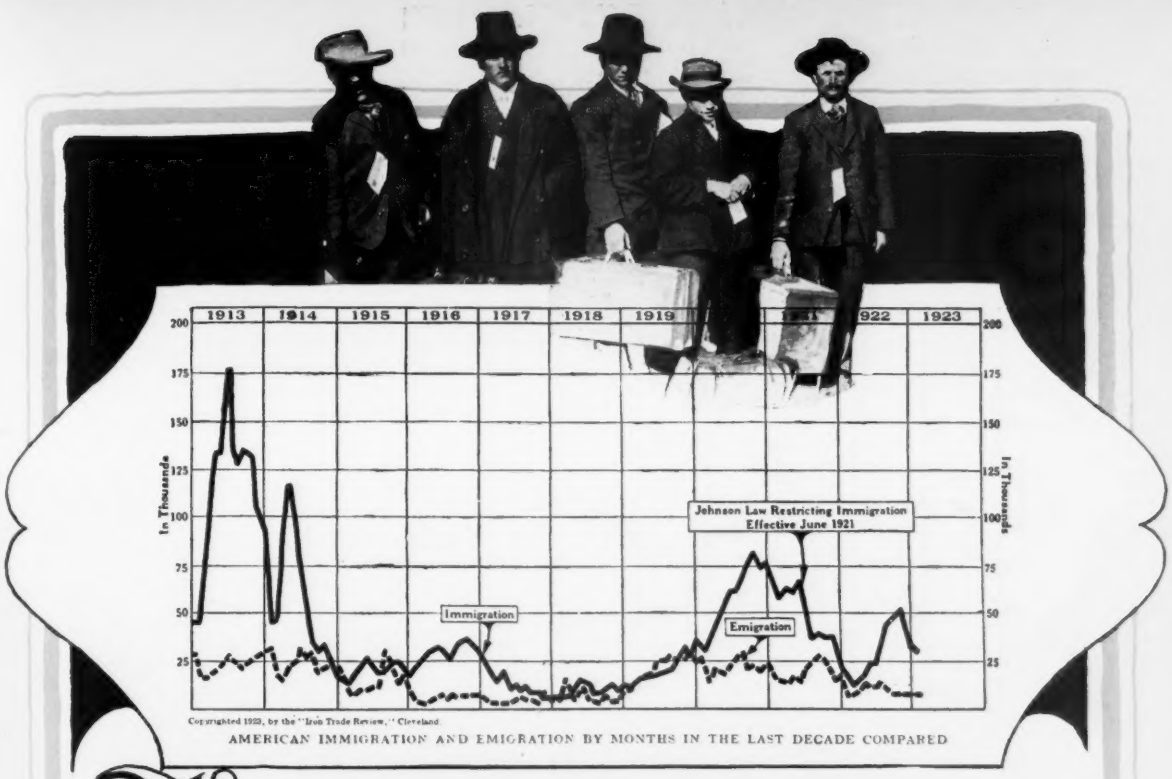
Write for our booklet MWR, which tells an interesting illustrated story about the "Telfax" Marker.

Our New Catalog Is Just Off the Press—Send for It

WILLIAMSPORT WIRE ROPE CO.

Main Office and Works
Williamsport, Penna.

Gen'l Sales Office
Peoples Gas Bldg., Chicago



AMERICAN IMMIGRATION AND EMIGRATION BY MONTHS IN THE LAST DECADE COMPARED

The falling immigration line need not affect your production line

Labor-saving equipment is the solution

The curtailment of immigration can be graphically shown on charts.

The effect of this labor shortage on American Industries must be faced as the individual problem of every American manufacturer because the results are shown in production.

How are *you* meeting this problem? What methods will *you* use to replace shortage of labor and aid the labor you *can* employ toward the production you desire?

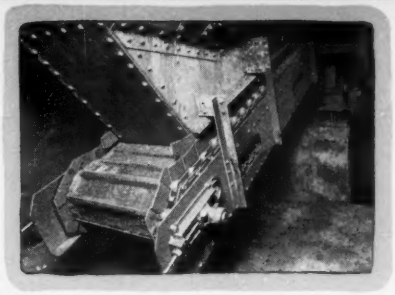
Jeffrey Labor-Saving, Material Handling Equipment boosts your production line regardless of the downward curve of immigration.

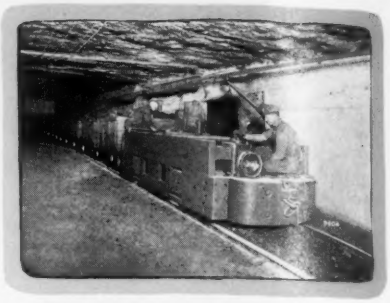
With Jeffrey Equipment, you can become immune from the present situation—which cannot be dodged. The line of immigration need not worry you if you meet the labor shortage with Jeffrey Conveyors and other Material Handling, Labor-Saving Equipment.

The Jeffrey Manufacturing Company
Columbus, Ohio

JEFFREY

MATERIAL HANDLING *AND* MINING EQUIPMENT



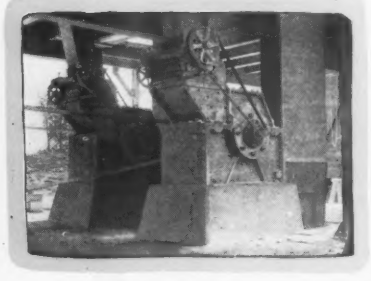


Jeffrey Material Handling Equipment answers the immigration problem

Problems involving the saving of labor, like these pictured, are typical of the cases where Jeffrey Labor-Saving, Material Handling Equipment steps in and closes the labor-gap caused by restricted immigration.

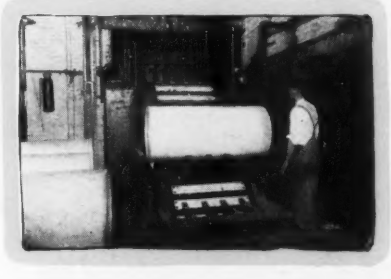
By taking the place of the human workers, not available, Jeffrey Equipment offsets the downward immigration curve and speeds up production in industry.

Are any of the pictures shown typical of *your* problems? Jeffrey Material Handling Equipment is successfully meeting similar conditions in the largest industries of the country.



Study these views and state ***your*** *problems. The proper equipment of Jeffrey design and manufacture is ready to meet it.*

The Jeffrey Manufacturing Company
Columbus, Ohio



JEFFREY

MATERIAL HANDLING AND MINING EQUIPMENT

Shope

One View of the Machines

Another View of Same Room

The Storage Yard, Showing Locomotive Crane for Handling Common Brick

The engravings shown here illustrate several of the important points about the Shope concrete brick plant operated by the Arundel-Shope Brick Co., Baltimore, Md.

The Arundel Corp., large producers of sand and gravel, formed the Arundel-Shope Co. and the subsidiary company is now a large consumer of sand.

This plant is probably one of the most modern concrete brick plants in the country. It is practically automatic in operation, and every device to insure accuracy of measurement in proportioning raw materials is provided. Facilities for loading and storing brick are admirable, and arrangements towards expansion have been made.

This company now has 19 brick machines, one tile machine and one side facing machine. The Arundel-Shope Brick Co. started operation on September 22, 1922. On March 3, 1923, they had delivered 400,000 brick and had orders for 8,000,000 more. They are now producing face and common brick at the rate of 100,000 per day and are behind in orders. The Arundel-Shope Brick Co. is a decided financial success, besides being a great consumer of sand and gravel produced by the parent corporation.

It is in this connection that producers of sand, gravel, crushed stone or slag are the

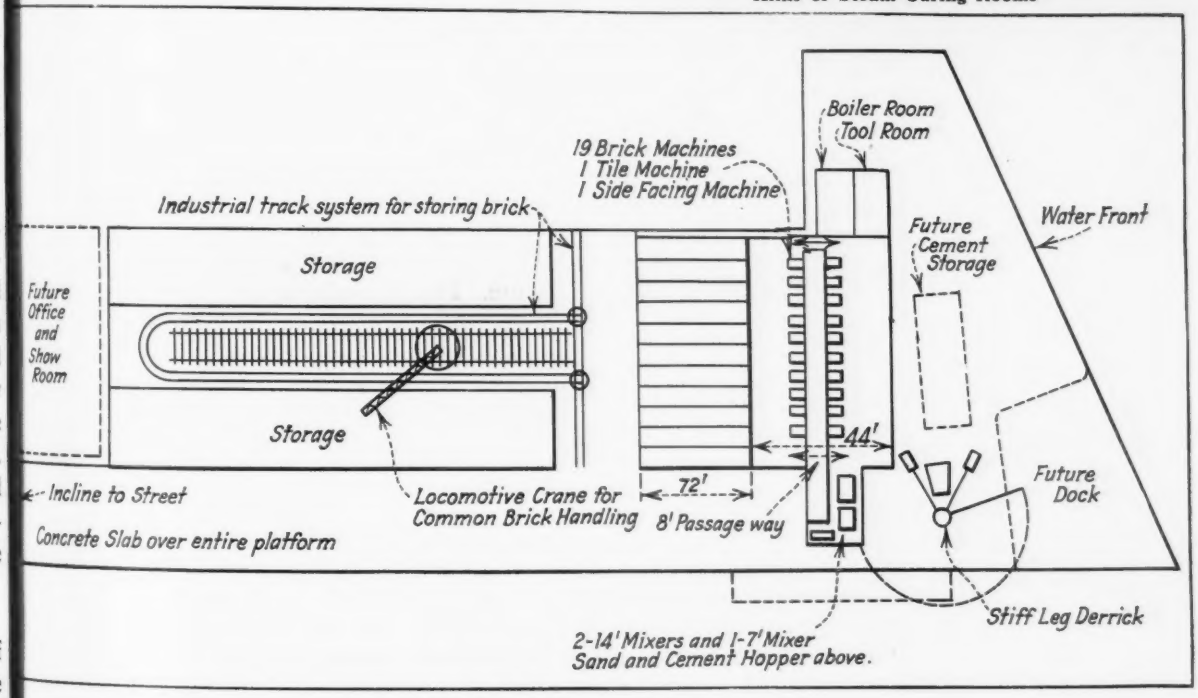
Brick

logical manufacturers of Shope Concrete Brick. There is a good margin of profit in the brick, besides the profit in the non-metallic mineral you produce.

There is no competition making and selling Shope Brick. Certain territory is allotted each licensee and our agreements are rigidly lived-up to.

You are missing a great opportunity if your territory is still open. Why not write today?

Kilns or Steam Curing Rooms



Layout of Industrial Railway at Storage Yard

Portland, Oregon

IMPERVIOUS
FIRE
RESISTING

KOEHRING

Crane Excavator

Quickest Changeability Greatest Flexibility

TWO line speeds from two independently controlled drums. Change from dragline to clamshell work, merely by shifting a clutch! No gearing to replace. As quickly changed into power shovel—easily changed for pile driver and magnet.

A lever for every function

No double function levers. Combine any functions at will as a time-saving practice. The Koehring is designed for it. No penalty of excess wear.

Koehring "heavy duty" construction means the utmost of safety-margin against breakdowns and delays, the utmost of trouble-free service life.

Write for Koehring Crane Catalog No. 29 today.

No. 2 Capacity: 12 tons at 12′ radius. ½ yard clamshell bucket loaded with sand or gravel at 45′ radius. ¾ yard clamshell bucket loaded with sand or gravel at 39′ radius. 1 yard clamshell bucket loaded with sand or gravel at 33′ radius. 1½ yard clamshell bucket loaded with sand or gravel at 24′ radius. 1 yard Page drag bucket on a 40′ boom.

No. 3 Capacity: 20 tons at 12′ radius. 1 yard clamshell bucket loaded with sand or gravel at 50′ radius. 1½ clamshell bucket loaded with sand or gravel at 39′ radius. 2 yard clamshell bucket loaded with sand or gravel at 33′ radius. 1½ yard Page drag bucket at 40′ radius.

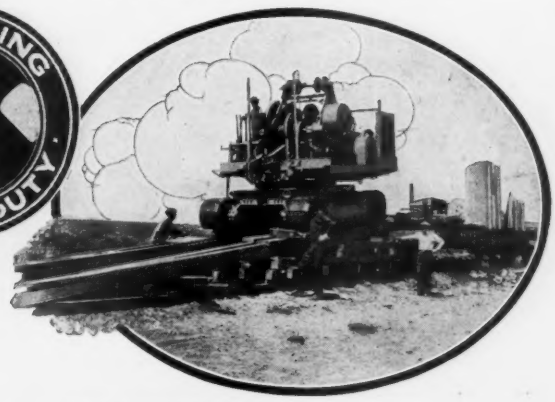
No. 1 Capacity: Equipped with 30′ boom. Handles ¾ yard bucket at 25′ radius; lifting capacity at 12′, 14,000 lbs. 4 cylinder 5″ x 6″ gasoline engine.

KOEHRING COMPANY

MANUFACTURERS OF CONCRETE MIXERS AND CRANE EXCAVATORS

MILWAUKEE, WISCONSIN

KOEHRING · K · HEAVY DUTY



Screening for Profit!

Cost of HUM-MER | *Profit Earned in One Year* | *Profit Earned in One Year* | *Profit Earned in One Year*

Compare the profits with the cost!

That the user gets far more profit out of the sale of a HUM-MER Electric Screen than does The W. S. Tyler Company, is graphically shown above.

Note that in these installations the profits earned in one year exceeded the cost of the HUM-MER installation from 9 to 16 times. In 5 years one of the installations would earn profits amounting to more than 80 times the selling price of the HUM-MER.

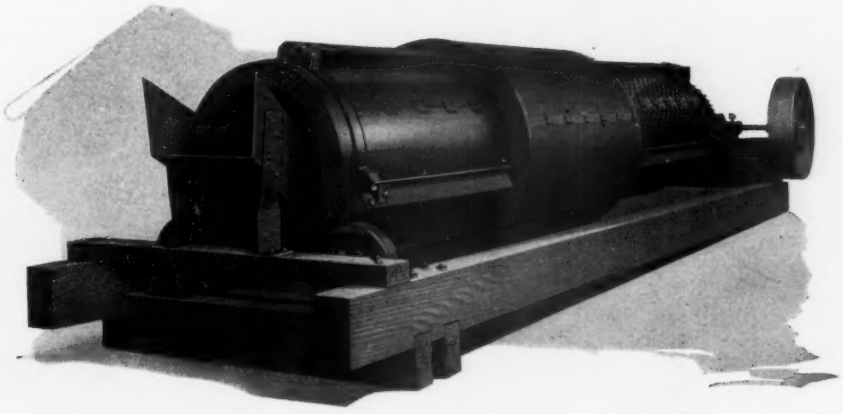
These are only a few of the many instances where HUM-MER Electric Screens have paid for themselves within a short time.

Why not secure this profit? Send us your flow-sheet or diagram of your crushing or screening operation that we may write you about the equipment we would suggest for your particular proposition.

Type 37 — 6-Foot, 2 Surface HUM-MER Electric Screen

Screens wet and dry materials from 2½ inch opening to minus 200 mesh

THE W. S. TYLER COMPANY
Cleveland, Ohio
Manufacturers of Woven Wire Screens and Screening Equipment



Giving a Greater Service

This combination scrubber and screen represents an unusual value to the producer who seeks a machine of the highest caliber for quantity production. Its construction is simple and durable. There is nothing to get out of order or make trouble.

TOEPFER

Combination Scrubber and Screen

represents years of engineering and manufacturing experience; years of preparation in the production of a machine that will use less water, less space, and less power than any other type of scrubber on the market. If you want results it will pay you to make a careful investigation of this unusual machine.

W. TOEPFER & SONS COMPANY

Milwaukee - - - - Wisconsin

These Accessories are Important! Select them with Care

BE SURE that the du Pont label is on your blasting accessories as well as on the explosives themselves—for the finest explosives made will not deliver maximum effect unless used with the best detonators and accessories. The experience of 121 years enables the du Pont Company to offer the most efficient and economical accessories for every class of explosives work.

Blasting Caps	**Electric Blasting Caps**
Delay Electric Blasting Caps	**Fuse**
Blasting Machines	**Delay Electric Igniters**
Galvanometers	**Rheostats**
Leading Wires	**Cap Crimpers**
Tamping Bags	**Thawing Kettles**

Write for Blasting Accessories Catalog containing description of above accessories and practical information about their use.

E. I. DU PONT DE NEMOURS & CO., Inc.
Explosives Department
Wilmington - Delaware

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Chicago	Ill.	New York	N. Y.	Scranton	Pa.
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DU PONT PRODUCTS EXHIBIT, ATLANTIC CITY, N. J.

DU PONT

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Hercules
One-to-fifty-cap capacity

Hercules No. 2
One-to-ten-cap capacity

Hercules Midget
One-to-five-cap capacity

Select the Size That Suits You

Hercules (one-to-fifty-cap capacity). This new improved machine was developed during the war after the ordnance department found that the blasting machines formerly used on industrial work did not meet the requirements of military service. It weighs twenty-three pounds, which is about three pounds less than old machines rated to fire thirty caps, but in tests it has fired many more than fifty caps. However, we do not recommend connecting over fifty electric blasting caps in one series under proper working conditions. The machine, therefore, has a large power reserve when used up to its highest rated capacity.

Hercules No. 2 (one-to-ten-cap capacity). This is a smaller and lighter machine. It also has a high power reserve when firing at its maximum rated capacity of ten electric blasting caps. It weighs about nine pounds.

Hercules Midget. This is a pocket-size machine, which can be carried conveniently in the hand or suspended by a shoulder strap. It is well suited for coal mining requirements. Its rated capacity is one to five caps, which allows ample power reserve. It weighs about three pounds.

Our nearest branch office will promptly fill your orders.

HERCULES POWDER COMPANY

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The Shovels Like A Clean Pull

STEADY shoveling right up to the face—no obstructions—no waits —no loss and maximum production.

Grasselli Explosives do it!

No matter how hard the shooting problem may be, there is a Grasselli Explosive ready to do the work—well.

Nitro Glycerine, Ammonia and Gelatine grades are usually used in difficult places.

One of our service men is ready to co-operate with you wherever and whenever you may desire.

The Grasselli Powder Co.
Main Office: Cleveland, Ohio

Philadelphia
Pittsburgh
Chicago
Birmingham
Brownsville, Pa.

ESTABLISHED 1839 CHEMICALS ZINC GRASSELLI EXPLOSIVES DYESTUFFS

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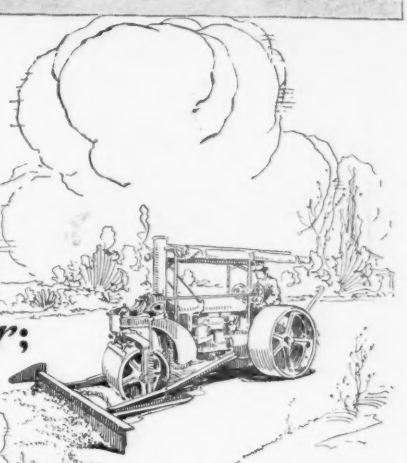
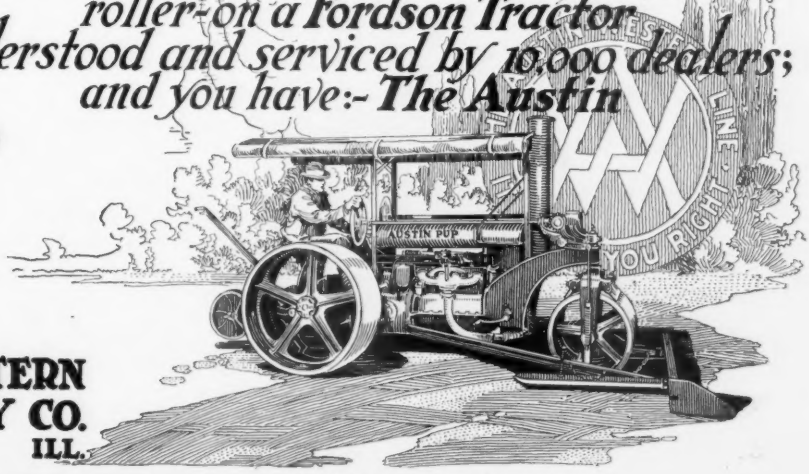
GRASSELLI EXPLOSIVES

A Sure Cure for Bad Roads



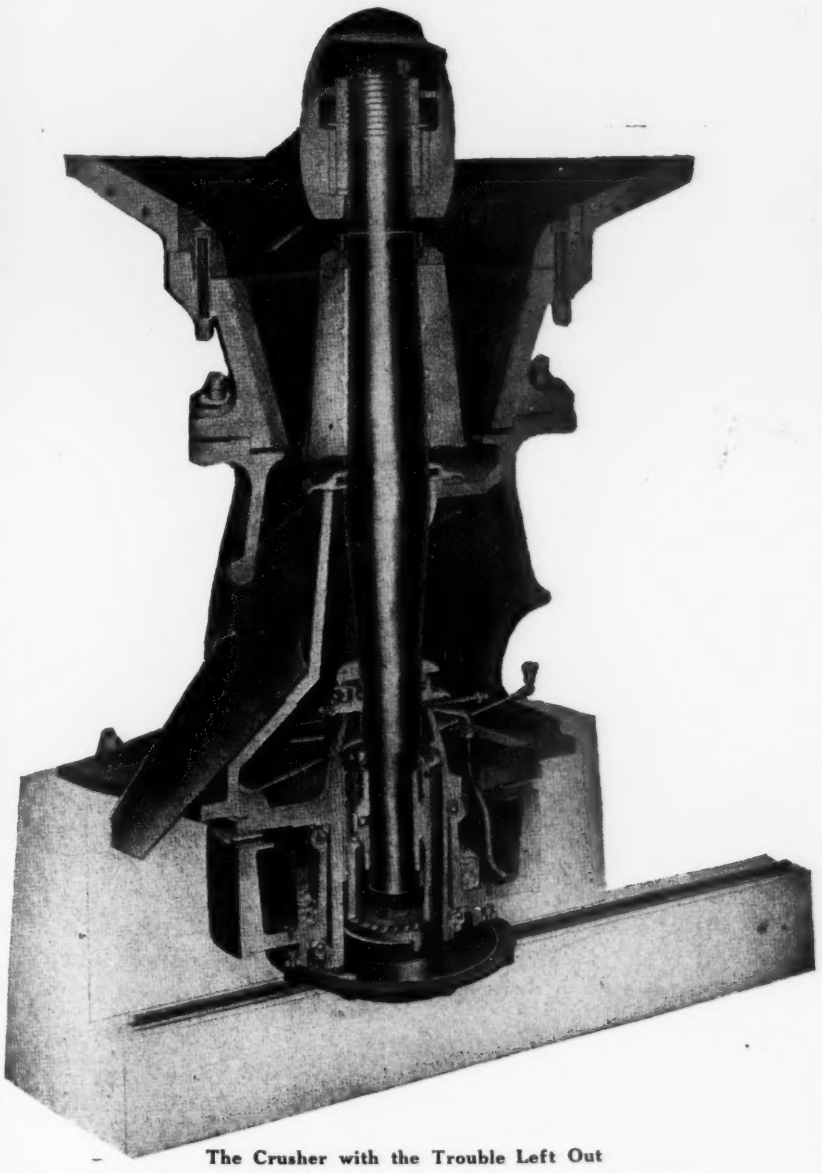
Take a
Highly perfected
Earth, gravel and stone road maintainer;
Add an
Unusually efficient
Scarifier;
Then for good measure throw
In a real roller (a combination
Never before found in a single machine);
Put all three - maintainer, scarifier and roller - on a **Fordson Tractor**
Understood and serviced by 10,000 dealers;
and you have:- **The Austin**
Pup



THE AUSTIN-WESTERN ROAD MACHINERY CO.
CHICAGO ILL.

KENNEDY *GEARLESS* CRUSHERS

The Kennedy has revolutionized the rock crushing industry. It represents a definite step in advance, and is unquestionably the best, strongest, and most efficient unit known to rock crushing engineering.



The Crusher with the Trouble Left Out

Points of Superiority

1. Less Power Consumption
2. Low Operating Cost
3. Continual Operation —Not Limited to Safe Gear Speed— Strikes a Harder Blow, and Has Increased Capacity
4. Perfected Dust Proof Circulating Oiling System
5. Can Be Set in Any Position—And Takes Less Room
6. Equipped with Patented Ball and Socket Eccentric
7. Noiseless

Parts Eliminated

1. Outboard Bearing
2. Counter Shaft
3. Inner Bearing Cap
4. Base, and Support
5. Thrust Ring
6. Pinion
7. Gear
8. Key for Gear
9. Two Steel Wearing Rings
10. Bronze Wearing Rings

Parts Added

1. Set Balls
2. Ball Race Rings
3. Ball Retainer

This improvement has actually reduced cost of maintenance 80%, not including head and concaves.

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Kennedy Van Saun Mfg. and Eng. Corp.

50 Church St., New York

Compagnie Des Entreprises Industrielles
40 Rue des Mathurins, PARIS

Harron Rickard & McCone, Inc., San Francisco and Los Angeles

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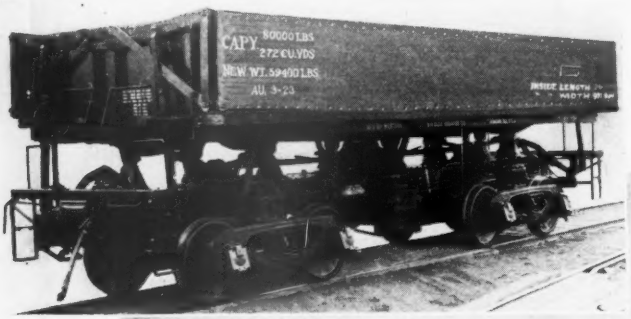

Western

That's Why

WESTERN DUMP CARS

at the LIMESTONE PRODUCTS CO.

Western dump cars fill the bill!

The Limestone Products Company, Menominee, Michigan, buys stone from the largest quarry operation in the world. This stone moves from quarry face to crushing plant in 30-ton Western contractor type dump cars (a suitable type for all large quarry operations).

Unloaded automatically from boats at Menominee, the stone is fed to the kilns in Western all-steel rocker-type dump cars (suitable for small quarry and lime plant operations).

Western dump cars at both ends of the line! No operation too big and none too small for economical use of Western made cars.

Western Wheeled Scraper Company

Earth and Stone Handling Machinery

Aurora, Illinois